ADTRAN

TSU 120 & 120e
User Manual

**Part Number
1202129L1
1202129L2**

Trademarks:

Windows is a registered trademark of Microsoft Corp.
T-WATCH Pro is a trademark of ADTRAN, Inc.

OpenView® is a trademark of Hewlett Packard.
SLC96 is a trademark of AT&T

ADTRAN Year 2000 (Y2K) Readiness Disclosure

ADTRAN has established a Year 2000 program to ensure that our products will correctly function in the new millennium. ADTRAN warrants that all products meet Y2K specifications regardless of model or revision.

Information about ADTRAN's Y2K compliance program is available at the following locations:

ADTRAN Web Site	www.adtran.com
Product Matrix	www.adtran.com/y2kfax.html
Faxback Document Line	(256) 963-8200 *Y2K plans and product certifications are listed in the matrix.*
Y2K Project Line	(256) 963-2200
E-mail	year2000@adtran.com

NOTE *Notes provide additional useful information.*

CAUTION *Cautions signify information that could prevent service interruption.*

WARNING *Warnings provide information that could prevent damage to the equipment or endangerment to human life.*

FCC Regulations Require that the Following Information be Provided to the Customer

1. This equipment complies with Part 68 of the FCC rules. The required label is attached to the bottom of the chassis.

2. An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. See installation instructions for details.

3. If your TSU 120 causes harm to the telephone network, the Telephone Company may discontinue your service temporarily. If possible, they will notify you in advance. If advance notice is not practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

4. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

5. If you experience trouble with the equipment TSU 120, please contact ADTRAN at (256) 963-8000 for repair/warranty information. The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected, or until you are sure the equipment is not malfunctioning.

6. This unit contains no user serviceable parts.

7. The following information may be required when applying to your local telephone company for leased line facilities.

Service Type	REN/SOC	FIC	USOC
1.544 Mbps -SF	6.0N	04DU9-BN	RJ-48C
1.544 Mbps - SF and B8ZS	6.0N	04DU9-DN	RJ-48C
1.544 Mbps - ESF	6.0N	04DU9-1KN	RJ-48C
1.544 Mbps - ESF and B8ZS	6.0N	04DU9-1SN	RJ-48C

Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE *Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.*

WARNING *Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

CANADIAN EMISSIONS REQUIREMENTS

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

CANADIAN EQUIPMENT LIMITATIONS

NOTE *The Industry Canada Certification label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.*

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic waterpipe system, if present, are connected together. This precaution may be particularly important in rural areas.

NOTE *Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or an electrician, as appropriate.*

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the equipment that the total of the LNs of all devices does not exceed 100.

The ringer equivalence number (REN) assigned to each terminal adapter is used to determine the total number of devices that may be connected to each circuit. The sum of the RENs from all devices in the circuit should not exceed a total of 5.0.

Affidavit Requirements for Connection To Digital Services

- An affidavit is required to be given to the telephone company whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which are intended for eventual conversion into voiceband analog signals and transmitted on the network.

- The affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specifications.

- End user/customer will be responsible to file an affidavit with the local exchange carrier when connecting unprotected CPE to a 1.544 Mbps or subrate digital services.

- Until such time as subrate digital terminal equipment is registered for voice applications, the affidavit requirement for subrate services is waived.

Affidavit For Connection Of Customer Premises Equipment To 1.544 Mbps And/or Subrate Digital Services

For the work to be performed in the certified territory of
_____(telco name)

State of _____

County of _____

I, _____ (name),

(business address), _____ (telephone number) being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps and/or _____ subrate digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specifications. With respect to encoded analog content and billing protection:

( ) I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to analog content and encoded billing protection information continuously complies with Part 68 of the FCC Rules and Regulations.

( ) The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

( ) The encoded analog content and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s)/maintainer(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following (check appropriate blocks):

x

( ) A. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) B. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) C. An independent training course (e.g., trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) D. In lieu of the preceding training requirements, the operator(s)/ maintainer(s) is (are) under the control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (telco's name) with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, if so requested.

_____Signature

_____Title

_____ Date

Transcribed and sworn to before me

This _____ (month/day/year)

_____

Notary Public

My commission expires:

_____

IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, please follow these basic safety precautions to reduce the risk of fire, electrical shock, or personal injury:

1.   Do not use this product near water, such as near a bath tub, wash bowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool.

2.   Avoid using a telephone (other than a cordless-type) during an electrical storm. There is a remote risk of shock from lightning.

3.   Do not use the telephone to report a gas leak in the vicinity of the leak.

4.   Use only the power cord, power supply, and/or batteries indicated in the manual. Do not dispose of batteries in a fire. They may explode. Check with local codes for special disposal instructions.

SAVE THESE INSTRUCTIONS

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within five years from the date of shipment if the product does not meet its published specifications or if it fails while in service. For detailed warranty, repair, and return information, see the ADTRAN Equipment Warranty and Repair and Return Policy Procedure.

Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

For Service, RMA requests, or more information, contact one of the numbers found at the inside back page of this manual.

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TSU 120 User Manual

Chapter 1   Introduction

TSU 120 OVERVIEW

This manual covers the use of the following products:

- TSU 120
- TSU 120e

Unless otherwise stated, the TSU 120 refers to both products.

The TSU 120 is a T1/FT1 multiplexer with an Nx56/64 V.35 data port, a DSX-1 (PBX) interface, one option slot, and embedded SNMP management. The TSU 120e offers a built-in dial back up feature for the Nx port. The TSU 120's option slot accepts one of many available option modules for voice and data applications.

The TSU 120 links user data sources such as local area network (LAN) bridges and routers, computers, CAD systems, teleconferencing equipment, and PBXs. Through the use of multiple data ports, the TSU 120 can simultaneously connect one or more of these devices to a T1 circuit. The amount of bandwidth allocated to each port is custom-programmable. You can manually allocate bandwidth or set the bandwidth to automatically change at predetermined times to use the available bandwidth most advantageously. Changes in the configuration do not disrupt data flow in channels that are not being reconfigured. The unique architecture and the availability of option modules provides a path for growth to accommodate future requirements.

The TSU 120 offers a wide variety of network management options. You can manage via SNMP through the 10BaseT (TSU 120e only) or chain-in ports. If you are using T-WATCH Pro, a Microsoft Windows® -based program, you can manage the TSU 120 via the same 10BaseT (TSU 120e only) or chain-in ports. An enhanced VT 100 terminal interface is also provided.

Standard Features in the TSU 120

The following list describes the standard features in both the TSU 120 and the enhanced TSU 120e.

- A single T1 interface.
- An Nx56/64 V.35 port and DSX-1 (PBX) interface.
- SNMP, Telnet, and T-WATCH Pro management via SLIP or 10BaseT (10BaseT is only in the TSU 120e).
- Ability to proxy for "agentless" units
- Enhanced terminal mode
- An inband communication channel requiring only 8k of bandwidth from a single DS0.
- One option slot to house option modules with up to four additional ports, including voice and data.
- Allows mix of port types to meet the data interface requirements.
- Easy configuration capabilities using simplistic menus displayed in a liquid crystal display (LCD) window operated by a front panel keypad.
- Two programmable configuration maps that define the bandwidth allocation between data ports.
- Data drop and insert, as well as full drop and insert.
- Flash memory for software updates.
- Timing is selectable from the network, from the Nx56/64 or DSX-1 ports, internally, or from a secondary interface.
- Fractional T1 loopbacks as defined in Annex B of ANSI T1.403-1995
- QRSS; 511 test patterns using Nx option.
- Integrated Dial Backup Capability in the Base Nx56/64 port (TSU 120e only)
- Extensive self-testing and monitoring provides assurance of proper operation.

TSU Option Modules

Some of the option modules available for the TSU 120 are:

Name	Description
DSX-1	Short haul T1 interface for operation with a PBX (Terminal Interface).
Full Drop and Insert	Permits the dropping of data and insertion of new data into the same DS0 time slot. Includes a long haul DS1 interface. Can be used as a second DS1 interface to provide up to 3 MB aggregate throughput.
Nx56/64 Serial Interface	Provides a V.35 serial interface in either single or dual versions.
Voice Interface	2/4 channel FXS/FX0/E&M.
OCU DP	Interfaces to DDS or 4-wire Switched 56.
DSU DP	Provides two sync or async ports (232 or V.35).
Dial Backup	Allows data backup upon network T1 failure.
U-BR1TE	Allows ISDN lines to be extended over a T1 line.
Router	Provides 10BaseT port and integrated IP/IPX routing.
NxIQ	Provides Frame Relay monitoring capabilities.

Option Module Architecture

The TSU 120 features a unique architecture that allows you to add one option module and plug-on board to accommodate another application. See *Figure 1-1*.
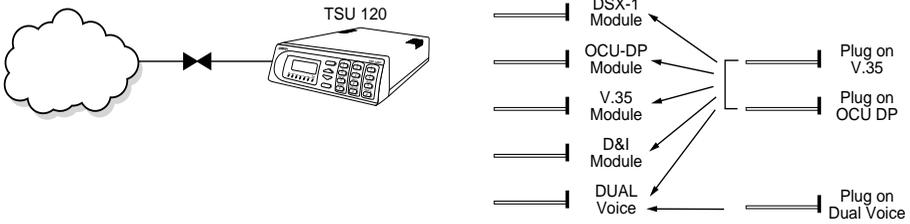
Figure 1-1. TSU Option Modules

TSU 120 CONFIGURATION APPLICATIONS

The following example illustrates possible configurations of TSU 120 applications.

Router, PBX, Video Conferencing Applications

The base Nx54/64 provides a V.35 interface to a router. The PBX is interfaced to the TSU 120 with the base DSX-1 interface. An OCU DP module and OCU DP plug-on board provide two Switched-56 circuits for video conferencing. The 10BaseT port allows SNMP network management over the LAN (TSU 120e only). See *Figure 1-2*.
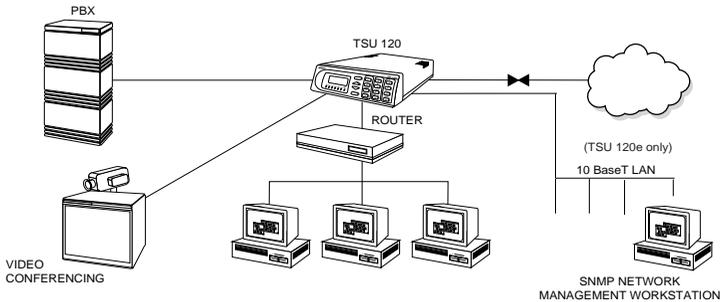
Figure 1-2. Router, PBX, Video Conferencing Application Set Up

Chapter 2   Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the TSU 120 for any shipping damages. If you suspect damage, file a claim immediately with the carrier and then contact ADTRAN Customer Service (see inside the last page of this manual). If possible, keep the original shipping container for use in shipping the TSU 120 back for repair or for verification of damage during shipment.

ADTRAN Shipments Include

- The TSU 120
- Two-line interface cable: an 8-position modular to 8-position modular (15 ft.)
- Loopback plug
- DB 15 to RJ adapter
- DB 25 to RJ adapter
- An 8-position modular cable for connection to the chain-in port (6 ft.)
- The *TSU 120 and TSU 120e User Manuals*

Customer Provides

- Cables for any expansion modules to be used with the TSU 120
- 10BaseT cable for connection to a LAN or router, if you plan to use remote management features (TSU 120e only)

Power Connection

Each TSU 120 is equipped with a captive eight-foot power cord, terminated by a three-prong plug which connects to a grounded power receptacle.

CAUTION

Power to the TSU 120 must be from a grounded 90-120 VAC, 50/60 Hz source.

GROUNDING INSTRUCTIONS

Grounding instruction information from the *Underwriters' Laboratory UL 1950 3rd Edition*, is provided in this section.

An equipment grounding conductor that is not smaller in size than the ungrounded branch-circuit supply conductors is to be installed as part of the circuit that supplies the product or system. Bare, covered, or insulated grounding conductors are acceptable. Individually covered or insulated equipment grounding conductors shall have a continuous outer finish that is either green, or green with one or more yellow stripes. The equipment grounding conductor is to be connected to ground at the service equipment.

The attachment-plug receptacles in the vicinity of the product or system are all to be of a grounding type, and the equipment grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.

A supplementary equipment grounding conductor shall be installed between the product or system and ground that is in addition to the equipment grounding conductor in the power supply cord.

The supplementary equipment grounding conductor shall not be smaller in size than the ungrounded branch-circuit supply conductors. The supplementary equipment grounding conductor shall be connected to the product at the terminal provided, and shall be connected to ground in a manner that will retain the ground connection when the product is unplugged from the receptacle. The connection to ground of the supple-

mentary equipment grounding conductor shall be in compliance with the rules for terminating bonding jumpers at Part K or Article 250 of the National Electrical Code, ANSI/NFPA 70. Termination of the supplementary equipment grounding conductor is permitted to be made to building steel, to a metal electrical raceway system, or to any grounded item that is permanently and reliably connected to the electrical service equipment ground.

Bare, covered, or insulated grounding conductors are acceptable. A covered or insulated grounding conductor shall have a continuous outer finish that is either green, or green with one or more yellow stripes.

The supplemental grounding conductor shall be connected to the equipment using a number 8 ring terminal. The terminal should be fastened to the grounding lug provided on the rear panel of the equipment. The ring terminal should be installed using the appropriate crimping tool (AMP P/N 59250 T-EAD Crimping Tool or equivalent).

Identification of Rear Panel Layout

The configuration of the rear panel of the TSU 120e is shown in *Figure 2-1*. The TSU 120 rear panel is shown in *Figure 2-2*.
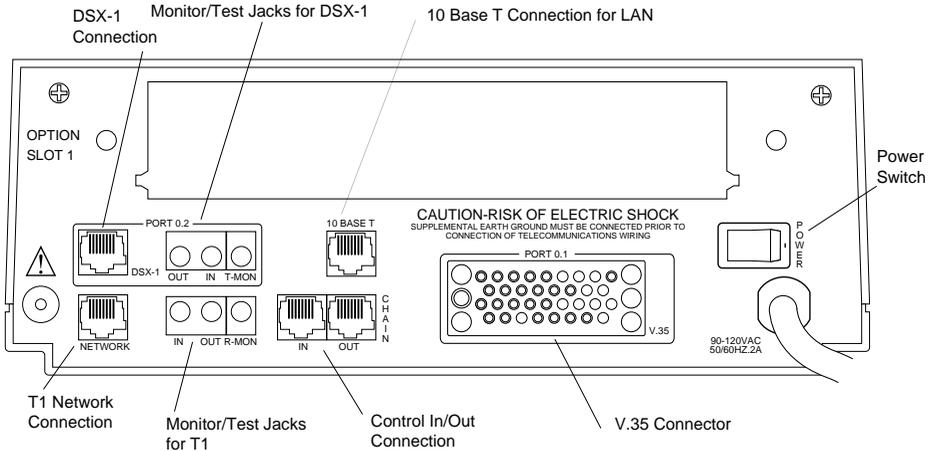
Figure 2-1. TSU 120e Rear Panel
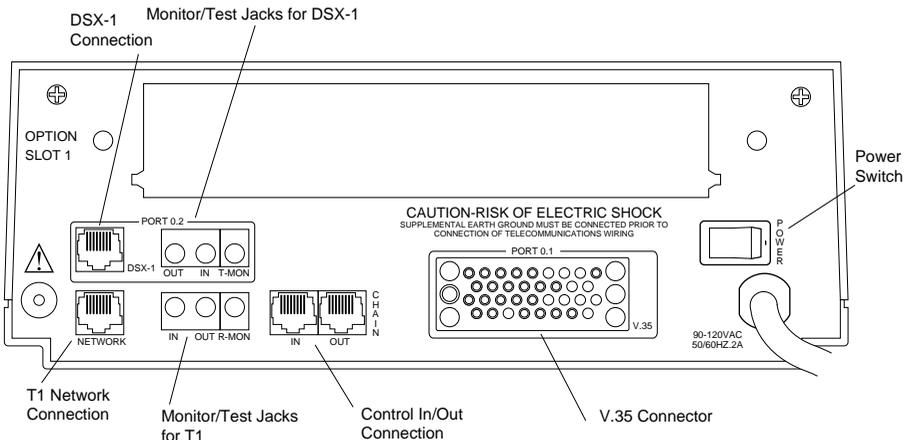
Figure 2-2. TSU 120 Rear Panel

TSU 120 Interfaces

The TSU 120 is equipped with a Nx56/64 data port, a DSX-1 interface, an option slot, management interfaces, and a T1 interface, in the rear panel. See *Figure 2-3*.
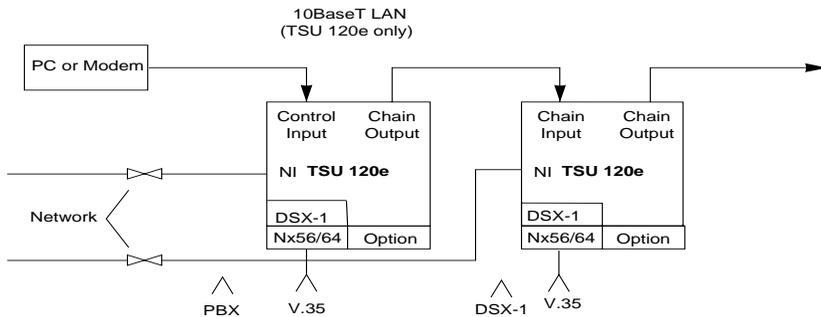
Figure 2-3. TSU 120 Interfaces

Network Interface

The Network Interface (NI) port provides the connection to the T1. This port complies with the applicable ANSI and AT&T standards. For more information see the *Wiring* section in *Appendix C, on page C-1*.

Network Test Interface

The **IN and OUT test jacks** for the network interface provide intrusive test capability for the incoming T1. By connecting to these jacks with test equipment, the T1 connection will be broken, and the test equipment will terminate the incoming T1. The **R-MON test jack** provides a bridged access jack for non-intrusive monitoring of the incoming T1. When connected to this jack, the test equipment should be configured for a bridged termination.

Nx56/64 Serial Interface (TSU 120e only)

The Nx56/64 provides a serial V.35 port that operates from 56 kbps to 1.536 Mbps. This port provides 511 pattern generation and detection and remote loopback capability.

DSX-1 (PBX) Interface

The DSX-1 Interface provides a short haul T1 for a PBX or other equipment. This port complies with ANSI T1.102.

DSX-1 Test Interface

The **IN and OUT test jacks** for the DSX-1 interface provide intrusive test capabilities for the T1 connecting the TSU 120 to the PBX or other customer premise equipment. By connecting to these jacks with test equipment, the DSX-1 connection will be broken, and the test equipment will be terminating the DSX-1 connection from the PBX.

The **T-MON test jack** provides a DSX monitor access jack for non-intrusive monitoring of the T1 connecting the TSU 120 to the PBX or other customer premise equipment. When connected to this jack, the test equipment should be configured for a **DSX MON** termination.

Chain Port Input

The chain port input provides an EIA-232 input from a PC or a modem for control of the TSU 120. You can also use it as a chain input from another TSU 120 or the TSU 100. For more information see the *Wiring* section in *Appendix C, on page C-1.*

Chain Port Output

The chain port output provides an EIA-232 output to chain control to other TSUs. For more information see the *Wiring* section in *Appendix C, on page C-1.*

10BaseT Interface (TSU 120e only)

The 10BaseT interface provides the LAN interface for managing the TSU 120 with SNMP or T-WATCH Pro. For more information see the *Wiring* section in *Appendix C, on page C-1.*

Power Up Testing

When shipped from the factory, the TSU 120 is set to factory default conditions. At the first application of power, the unit automatically executes a memory self-test. A full self-test can be run from the front panel. A passcode and Unit ID may be set using the **UTIL MENU**.

Self-Test

Upon a power-up, the LCD displays **MEMORY TEST NOW TESTING** and the Test LEDs are illuminated. When the self-test is completed with no failures detected, the **OK LED** lights up and the LCD momentarily displays **MEMORY TEST(S) PASSED**. If a failure is detected, a list of failures is displayed in the LCD window.

Initialization

Set User Passcode

The TSU 120 is designed to operate with or without the use of a passcode. The default condition is without a passcode.

NOTE

If the unit is to be remotely accessed using T-WATCH Pro, you must enter a passcode. When managing a number of units, the passcode can be the same for all the units.

The passcode should be a number easily remembered. Once entered, the passcode is required to access any operation other than viewing. See *Change/Set a Passcode on page 6-4* for details.

Set Unit Identification

The Unit ID sets the unit to respond to remote control (controlled by a device other than the front panel or terminal). If no Unit ID is recorded it is not possible to operate from any remote control device, including the local PC for T-WATCH Pro or SNMP. See *Unit ID on page 6-4* for details.

Set Chain Port Input

The TSU 120 can be configured from the chain port input when T-WATCH Pro, SNMP, or the terminal interface are being used. In this case, the chain port baud rate must also be selected.

Chain-In (PC)

The unit can be controlled from an external PC connected directly or via modem to the chain-in port. When using chain-in, the selection of the chain-in port baud rate from 9600 (factory default), 1200, 2400, 19200, or 38400 must be made using the **UNIT CONFIGURATION MENU**. See *Unit Menu on page 5-12* for details.

Unless locked out externally, the front panel can also control the unit.

Chain-in/Chain Out

TSU 120 units and other TSUs can be linked together to form a chain. *Figure 2-4* provides an example of a chain-in arrangement with a PC or a modem. The first TSU 120 in the chain receives controlling input from the PC or modem.
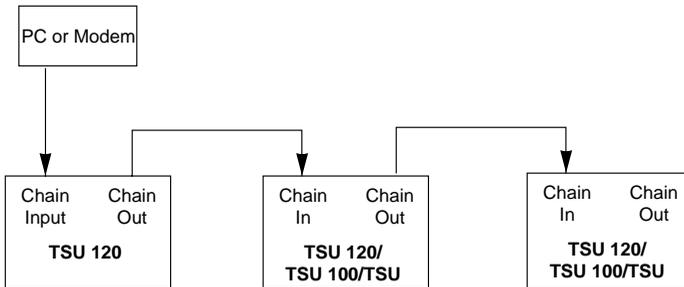
Figure 2-4. Example of Chain-in

Subsequent TSUs in the chain are in a position to intake information from another TSU. This in-taking of information from another TSU in the chain is identified as chain-in. The baud rate for the chained units must match that of the first unit.

Unless locked out externally, the front panel can also control the unit.

At this point, the Unit Initialization procedure is concluded. If the unit is to be configured remotely, there are no additional items necessary to complete prior to executing remote configuration.

The Passcode, the Unit ID, and the Control Port settings are stored in a nonvolatile memory. This ensures they are operable for subsequent power-up sequences.

Power-Up Procedure

After the unit has been put into operation with the initial power-up and initialization, the subsequent power-up procedure includes only the power-up self-test followed by the request for a passcode (password) if this option was selected during initialization. Use the **Number Keys** to enter the previously recorded passcode and press **Enter**.

Chapter 3   Operation

FRONT PANEL

The TSU 120 front panel monitors operation and controls the
configuration of the unit. The TSU 120 front panel is shown on
page 3-3. *Figure 3-1* describes each part of the front panel.

Table 3-1. Front Panel Descriptions

Name	Description
LCD Window	Displays menu items and messages in two lines by 16 characters and alarm and status information.
Enter	Selects active menu items. To select a menu item, press the number of the item. The menu item flashes, indicating it is activated. Press **Enter** to select the menu item.
Up and Down Arrows	**Up** and **Down Arrows** scroll through and activate the submenu items available in the current menu. When the submenu items are scrolled, the flashing cursor indicates the active parameters.
Cancel	Pressing the **Cancel key** stops the current activity and returns to the previous menu. Repeat until the desired menu level is reached. When a submenu item is displayed, press **Cancel** to exit the current display and return to the previous menu.

Table 3-1. Front Panel Descriptions

Name	Description
Numeric Keypad	The numeric keypad contains the numbers **0** through **9** which are used to activate menu items and enter information (such as the IP address).
Shift (entering special function keys)	Enter special function keys by pressing and holding **Shift** before pressing the key representing the desired character. To activate a special function key rather than a number, press and hold **Shift**; then the button. See *Operation Keys on page 3-5* for a description of the function keys. If a key is pressed without using **Shift**, the numbered item becomes active instead of the special function key.

LED Descriptions

CSU Status

The CSU status LEDs display the operational condition of the network interface located on the controller board in the unit.

OK (GREEN) — Indicates the operation is in the normal mode and no errors have been detected.

TEST (YELLOW) — Indicates that the network interface is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring on the network interface.

ERROR (RED) — Indicates an error such as a BPV, OOF, or CRC.

ALARM (RED) — Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the OK LED activates (turns on). To view an alarm condition, select the active alarm menu item or select **ALARM** by pressing **Shift+8**. If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the Unit History menu.

Figure 3-1. TSU 120 Front Panel Layout
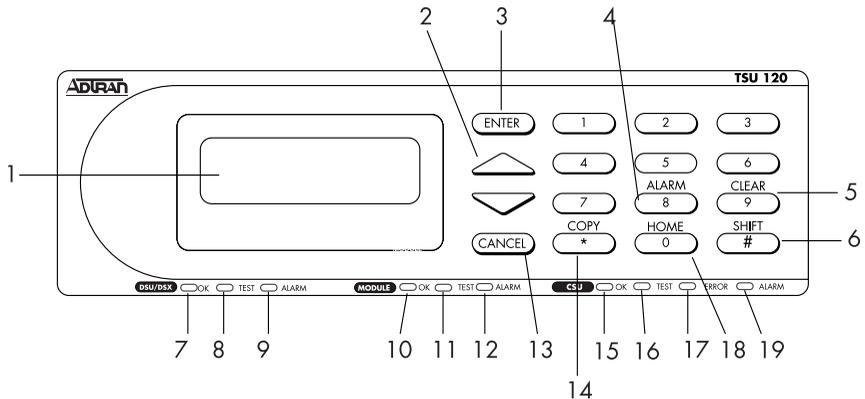
No	Description	Action/Status
1	LCD Window	Displays menu items and messages in 2 lines by 16 characters
2	Up and Down Arrows	Scroll through and activate the submenu items available in the current menu. The flashing cursor indicates the active parameter
3	Enter Key	Selects active item
4	Alarm	Quick access to the active display menus
5	Clear	Clears data/results fields
6	Shift	Provides access to special function keys
7	OK (DSU/DSX Status)	Operation is in normal mode with no detected errors
8	Test (DSU/DSX Status)	Active when the module is in test mode
9	Alarm (DSU/DSX Status)	Active when an alarm condition has been detected
10	OK (Module Status)	Operation is in normal mode with no detected errors
11	Test (Module Status)	Active when the module is in test mode
12	Alarm (Module Status)	Active when an alarm condition has been detected
13	Cancel	Stops current activity and returns to the previous menu
14	Copy	Copies last data entered into the current DS0
15	OK (CSU Status)	Operation is in normal mode with no detected errors
16	TEST (CSU Status)	Active when the network interface is in test mode
17	Error (CSU Status)	Indicates errors such as BPV, OOF or CRC
18	Home	Returns to the main menu
19	Alarm (CSU Status)	Active when an alarm condition has been detected on the network interface

DSU/DSX Status

The DSU/DSX status LEDs display the operational condition of the Nx56/64 and DSX-1 parts included in the TSU 120. It also reflects the status of the DBU in the TSU 120e.

OK (GREEN)   Indicates the operation is in the normal mode and no errors have been detected.

TEST (YELLOW)   Indicates that one of the interfaces is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring in at least one of the module ports.

ALARM (RED)   Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the **OK LED** activates (turns on). To view an alarm condition, select the active alarm menu item or select Alarm by pressing **Shift+8**. If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the Unit History Menu.

Module Status

The module status LEDs display the operational condition of ports installed in the option slots.

OK (GREEN)   Indicates the operation is in the normal mode and no errors have been detected.

TEST (YELLOW)   Indicates that one of the interfaces is operating in a test mode. This includes a self-test or a test loopback. When lighted, this LED also indicates that normal data flow is not occurring in at least one of the module ports.

ALARM (RED)   Indicates an alarm condition has been detected. When the alarm condition is no longer valid, the OK LED activates (turns on). To view an alarm condition, select the active alarm menu item or select Alarm by pressing **Shift 8**. If the alarm conditions have been corrected, the alarm which caused the activation of the Alarm LED can be viewed under the Unit History menu.

Operation Keys

COPY   Used in the DS0 mapping menu operations to copy the last data entered into the current DS0. This key operates without pressing the **Shift** key.

HOME   Returns home to the Main Menu from any menu location.

ALARM   Used as quick access to the active alarm display menus. This can be activated while any other menu item is in use. When the Alarm menu is exited, the unit returns to the location of the same menu that was active when Alarm was selected.

CLEAR   Used in various menus to clear data/result fields.

General Menu Operation

The TSU 120 uses a multilevel menu structure containing both menu items and data fields. All menu operations and data are displayed in the LCD window. The menu items are numbered and can be viewed by scrolling with the **Up** and **Down arrows**.

DATA FIELD   You can edit menu items followed by a colon (:).

DISPLAY ONLY FIELD   You cannot edit menu fields followed by an equal symbol (=). This symbol identifies a field used for value display only.

ARROWS   Menus that display small up or down arrows in the lower right corner indicate there are more menu items than are visible on a two-line LCD. Access the additional items with the up or down arrows. You can also access undisplayed menu items by using the appropriate menu number.

Select and Activate a Menu Item

To choose menu items, place the cursor on the desired menu item by pressing the number corresponding to the menu item or highlighting the menu item with the **up** and **down arrow**. Activate the **ALARM LIST** option from the **STATUS MENU** by using the following steps.

Step	Action
1	Activate the **STATUS MENU** using the **arrow keys** or by pressing **1**. The cursor will flash on the number next to the activated selection.
2	Press **Enter**.
3	View the submenu items by using the **arrow keys**.
4	Choose an item on the submenu such as **ACTIVE ALARMS**.
5	Select the submenu with the **Arrow Keys** or by pressing **3**.
6	Press **Enter**.
7	View the Alarm List by using the **arrow keys**.

.

	1) NI PERF RPTS	
	2) NI ERRORS	
	3) ACTIVE ALARMS	**(ALARM LIST)**
	4) VIEW HISTORY	END OF LIST
1)STATUS	5) PORT STATUS	
	6) REMOTE PORT	
	7) CLEAR PORT ALM	
	8) ENET STATUS	
	9) SLIP STATUS	
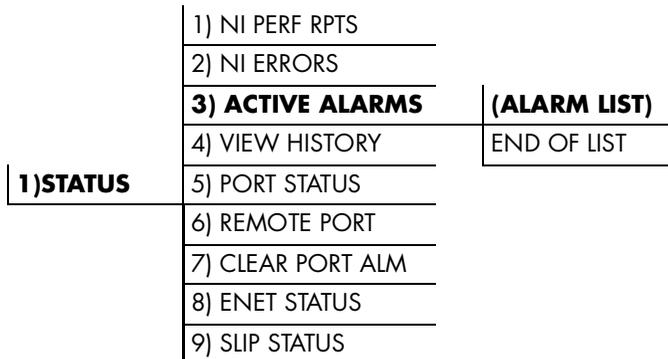
Figure 3-2. Example of Basic Front Panel Menu Tree

Set the Data Field

You can edit data fields preceded by a colon (:).

Step	Action
1	Position the cursor on the submenu item number, and press **Enter**. The cursor moves to the data field, (to the right of the submenu item name).
2	Using the **Arrow Keys**, scroll to scan the available value settings. The value settings display one at a time in the data field position.
3	When the desired value is displayed in the data field position, press **Enter** to set that value. When the value is set, the cursor moves back to the submenu item position indicating the operation is complete.
4	Select another submenu field, or press **Cancel** to return to the submenu.
5	Press **Cancel** before pressing **Enter** to void any data changes. The original data value is restored and the cursor returns to the submenu field.

Display Only Data Fields

Data fields preceded by an equal (=) symbol cannot be edited. See *Figure 3-3*.
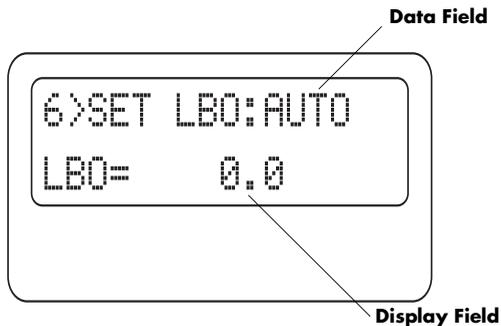
Figure 3-3. Display and Data Fields

Press **Enter** to move the cursor to the data field. Use arrows to select **AUTO** and press **Enter**. The unit automatically sets the Line Build Out. The display field shows the value actually set.

The equal symbol after LBO in the second line indicates the information that follows is displayed data and cannot be edited.

Exit Any Menu Field Operation Or Display

Press **Cancel** as many times as needed to return to the desired menu level or press **Shift+0 (Home)** to return to the main menu.

Data Port Identification

When configuring the unit, menu selections will include options from data port submenus. Selecting data ports is necessary because the TSU 120 uses a slot-port method to identify which data port the menu item is referencing. If a module containing a PBX DSX-1 option card with an Nx56/64 plug-on interface is installed in the option slot, it would be designated as:

DSX-1 Passthru=1.1
    Where slot=1 and port =1.
    The DSX-1 is located in the option slot and is the first port in that slot.

Nx56/64=1.2
    Where slot=1 and port=2.
    The Nx is located in the slot and is the second port in that slot.

The ports that are built into the TSU 120 are referenced as **Slot 0**. The **Nx56/64** would be designated as **0.1** and the **DSX-1** would be referenced as **0.2.**

Front Panel Menu Structure

The TSU 120 uses a multilevel menu structure containing both menu items and data fields. All menu operations and data display in the LCD window.

The opening menu is the access point to all other operations. Each Main menu item has several functions and submenus to identify and access specific parameters.

The front panel LCD of the Main menu contains the following options

1=STATUS   3=UTIL
2=CONFIG   4=TEST

Status

The Status menu displays all relevant information for the network and DTE interfaces. For detailed information on status options, see *Chapter 4, Status Menu on page 4-1.*

Config (Configuration)

The Configuration menu displays and sets the TSU 120 operational configuration, including all network interface parameters, the allocation of the DS0s, and the port parameters. For detailed information on configuration options, see *Chapter 5, Configuration Menu on page 5-1.*

Util (Utilities)

The Utility menu displays and sets system parameters. For detailed information on utility options, see *Chapter 6, Utility Menu on page 6-1.*

Test

The Test menu initiates different types of unit tests and displays test results in the LCD window. For detailed information on test options, see *Chapter 7, Test Menu on page 7-1.*

Alternate Methods of Control

T-WATCH Pro (ADTRAN PC Program)

T-WATCH Pro is the ADTRAN PC control program. It provides complete control over the configuration of the TSU 120 using a graphical interface. The T-WATCH Pro program displays the same status and performance data as the front panel LCD. This data is displayed in the form of tables and graphs.

The T-WATCH Pro program has the following capabilities:

- Interfaces with a modem which permits dialing into a remote TSU 120 location to configure the unit or read the status or performance of the unit.
- Receives traps from any TSU product.
- Records and creates display performance data over a 30-day period.
- Accesses units via the local area network (TSU 120e only).

T-WATCH Pro/LAN Connection

To set up the TSU 120 to work with T-WATCH Pro over the LAN, follow these steps:

Step	Action
1	Set the Unit ID using the front panel. See *Unit ID on page 6-4* for details.
2	Set **CONTROL PORT** interface to **NORMAL** using the Front Panel
3	Configure the **IP ADDRESS**, **DEFAULT GATEWAY**, and **SUBNET MASK** using the front panel.
4	Follow the installation instructions for T-WATCH Pro to start the program and connect to the unit.

T-WATCH Pro/EIA-232 Connection

To set up the TSU 120e to work with T-WATCH Pro over a direct EIA-232 connection, follow these steps:

Step	Action
1	Set the Unit ID and set a passcode using the front panel. See *Unit ID* on page page 6-4 and *Set a Passcode* on page 6-4 for details.
2	Set the control port rate to the same setting as the PC Com port.
3	Connect the PC Com port to the chain-in port on the TSU 120 using the DB25 adapter and modular cable provided.
4	Follow the installation instructions for T-WATCH Pro to start the program and to connect to the unit.

SNMP

The ADTRAN TSU 120 supports the Simple Network Management Protocol (SNMP) through the chain-in (SLIP) interface. The TSU 120e offers a 10BaseT connection which also supports SNMP. For more information on SNMP see *Appendix A, Understanding SNMP* on page A-1.

To use SNMP via 10BaseT (TSU 120e only), follow these steps:

Step	Action
1	Set **CONTROL PORT** to **NORMAL**.
2	Set the **IP ADDRESS**, **DEFAULT GATEWAY**, and **SUBNET MASK**.
3	The appropriate MIB browser must be loaded into the Network Management Station (available on the ADTRAN webpage at **http://www.adtran.com)**.
4	The MIB browser issues SNMP gets/sets to the TSU 120e.

To use SNMP via SLIP port, follow these steps:

Step	Action
1	Set **CONTROL PORT** to **SLIP**.
2	Set the **IP ADDRESS**. The **DEFAULT GATEWAY**, and **SUBNET MASK** are not used in SLIP.
3	The appropriate MIB browser must be loaded into the Network Management Station (available on the ADTRAN webpage at **http://www.adtran.com)**.
4	The MIB browser issues SNMP gets/sets to the TSU 120e.

Terminal Mode

The TSU 120 provides the front panel menus to a VT 100-type terminal. This mode can be used to configure and monitor the unit. Initiate this mode by keying in **<CTRL> PTT** on the terminal once it is connected to the chain-in port. For more information on this method of control, see *Chapter 8, Telnet/Terminal Menus on page 8-1.*

TELNET

To connect to the TSU 120 via TELNET, follow these steps.

Step	Action
1	Before attempting to connect via TELNET, first define the IP address, the default gateway, and the subnet mask using the front panel.
2	When you begin the TELNET session, you will be prompted for a password. The default password is **ADTRAN**.
3	You can change this password using the Management submenu. See *Default Unit Passcode on page 8-7* for more information.
4	The TELNET session will time out after a predefined value that is also set in the Management menu.

NOTE   *Only one TELNET session can be active at one time.*

Chapter 4   Status Menu

The Status menu branch provides the ability to view the status of the TSU 120 operation. See *Figure 4-1*.
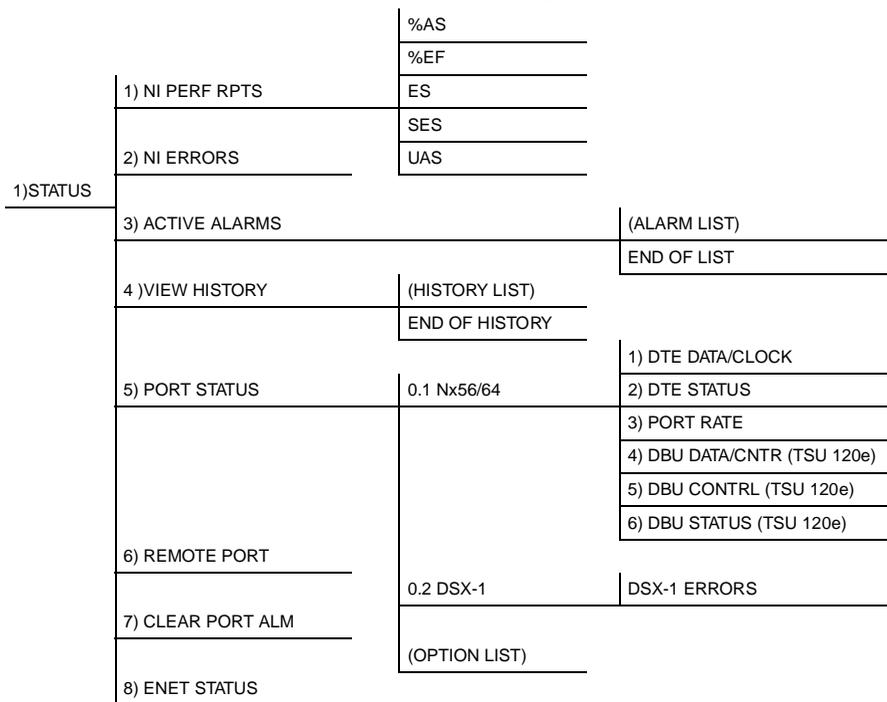
Figure 4-1. Complete Status Menu Tree

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the direction of scrolling to use to view additional menu items. At every level of the menu, pressing **Cancel** returns the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the main menu.

Network Performance Reports (NI PERF RPTS)

The Network Interface Performance Reports display the user copy of the performance data. The TSU 120 maintains this performance data on the network in compliance with ANSI T1.403 and AT&T document TR54016. The data displayed is data accumulated over the last 15 minutes and over the last 24 hours.

Use the scroll keys to access the complete display of the following report fields, as shown in Figure 4-2:

15 Minutes **24 Hours**

```
        15M/24H
ES=    10/120
```

Data Values
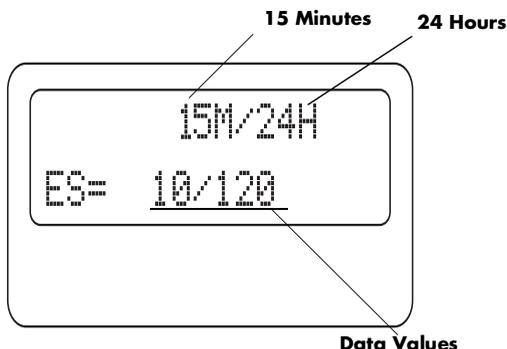
Figure 4-2. Network Interface Performance Report

%AS	Percentage of available seconds
%EF	Percentage of error-free seconds
ES	Number of errored seconds (1 or more errors/second
SES	Number of severely errored seconds (more than 320 errors/second)
UAS	Number of unavailable seconds (10 or more consecutive seconds)

If insufficient time has passed to collect data, **NA** displays. Continue with standard operating procedures to exit the display.

When this menu is active, performance data can be cleared by pressing **Clear (Shift+9)** on the keypad. Only the user copy of the performance data is cleared.

Since only the user's copy of performance data is cleared by the TSU 120, the data displayed here might be different from the data sent to the network as PRM data.

Network Interface Errors (NI ERRORS)

The **NI ERRORS** submenu displays the types of errors the Network Interface (NI) detects. A blinking CSU error LED indicates that network errors are detected.

The asterisk (*) above an item indicates the type of errors detected. The error types are the following:

CRC   CRC-6 bit errors based on the FDL. This is valid only in ESF mode.

BPV   Bipolar violations.

XS0   Excess zeros.

FER   Framing errors.

Active Alarms

This menu item displays a list of current alarms (**ALARM LIST**) reported by either the base controller or any of the ports. If no alarms are current, using this menu item displays **End of List**.

This display includes two lines of text. The top line is the alarm source. The bottom line is the alarm message. See *Figure 4-3* on page 4-4. A list of alarm messages is found in *Appendix C, TSU 120 System Messages* on page C-1.

In addition to normal menu operation, you can also access this menu item with the Alarm function (**Shift+8**) on the keypad. If one or more of the Alarm LEDs are illuminated, an alarm is present. Pressing **Cancel** returns to the previous menu item.

Alarm Source

```
┌─────────────────────────────┐
│  ┌───────────────────────┐  │
│  │ 1.1 NX56/64           │  │
│  │ PLL UNLOCK            │  │
│  └───────────────────────┘  │
│                             │
└─────────────────────────────┘
```
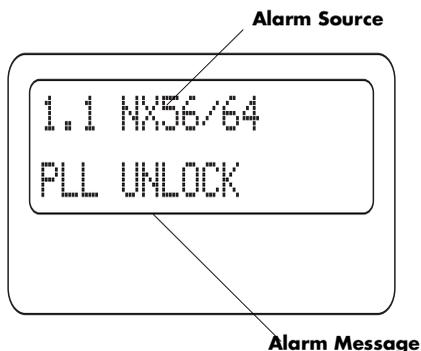
Alarm Message

Figure 4-3. Display of Alarm Message

View History

This menu item both displays and clears the accumulated sta-tus changes of the unit.

View History displays a history of the first 20 status changes in the unit, including the date, time, and type of change. The unit also records for viewing, the date and time an alarm became active and inactive, as well as the date and time of test activa-tion and deactivation.

To clear the View History display, press **Clear (Shift+9)** with the View History menu active.

Port Status

Port Status displays the signals monitored on the data ports. For example, the Nx/DBU interface monitors the RTS, CTS, and RD, along with other signal lines. When a port is selected, the LCD indicates if the signal is present.

The base Nx interface offers the status screen listed in this sec-tion. When using other option cards, refer to the appropriate separate manual for a definition of any status screens offered.

The Port Status of Nx/DBU is examined as an example of how to use this item. The DBU feature is available only in the TSU 120e.

0.1 Nx56/64 Menu Items

DTE Data/Clock

An asterisk (*) indicates an active status of the following lines.

TXD	Transmit data from the DTE
RXD	Receive data toward the DTE
XS0	Excess Zeros from the DTE
LCK	Lock Status of the phase locked loop

DTE Status

An asterisk (*) indicates an active status of the following lines:

RTS	Request to send from DTE
CTS	Clear to send to DTE
DCD	Data carrier detect to DTE
DSR	Data set ready to DTE

Port Rate

The port rate displays the current setting of the Nx port. Continue with standard operating procedures to exit the display.

DBU Data/CNTRL (TSU 120e only)

An asterisk (*) indicates an active status on the following lines:

TXD	Transmit data to the DCE
RXD	Receive data from the DCE
DCD	Data carrier detect from the DCE
RI	Ring indicate from the DCE

DBU Contrl (TSU 120e only)

RTS   Request to send to DCE

CTS   Clear to send from the DCE

DTR   Data terminal ready to the DCE

DSR   Data set ready from the DCE

DBU Status (TSU 120e only)

DBU SECS   Total seconds in current DBU session

IN DBU   YES/NO indication of active DBU status

0.2 DSX-1 Menu Items

DSX-1 Errors

CRC   An asterisk displays under the CRC if there are CRC errors in extended superframe format (ESF) mode. If the DSX-1 plug-on board is configured for D4 Frame format, the LCD displays **n/a.**

BPV   An asterisk displays under the BPV if the DSX-1 plug-on board detects bipolar violations.

SLIP   An asterisk displays under the SLIP if the DSX-1 plug-on board detects frame slips. This is caused by multiple clock sources in the application.

FER   An asterisk displays under the FER if the DSX-1 plug-on board detects frame bit synchronization errors.

Remote Port

Remote Port displays the status of activity on the control-in remote port. This is useful for troubleshooting communication sessions, and for verifying cabling.

RX	Characters received at remote port
ID	Unit ID received at remote port
CRC	Correct CRC received
PC	Correct passcode received
TX	Characters transmitted from the remote port

Clear Port Alarm (Clear Port Alm)

Clears the Link Failed alarms on option modules that have been removed from the TSU 120 chassis.

ENET Status (TSU 120e only)

TX	Indicates that data is being transmitted from the 10BaseT port.
RX	Indicates that data is being received by the 10BaseT port.
LNK	Indicates the current status of the 10BaseT link integrity test. This should always be on when the unit is connected to a functional 10BaseT hub.
CPU	Active when the CPE is accessing the 10BaseT interface.

Chapter 5   Configuration Menu

The **CONFIGURATION MENU** sets the TSU 120 operational config-
uration, including all network interface parameters, the alloca-
tion of the DS0s, and the port parameters. See *Complete
Configuration Menu on page 5-2.*

Menu flow is normally depicted from left to right. Arrows on
the lower right of the screen indicate the direction of scrolling
to view additional menu items. At every level of the menu,
pressing **Cancel** returns the system to the previous menu level.
Pressing **Cancel** repeatedly returns the system to the **MAIN
MENU**.

1) NETWORK (NI)	1) FORMAT		1) CTL PORT RATE
	2) CODE		2) TRAPS
	3) YEL ALARM		3) ACCESS
	4) XMIT PRM		4) INIT MODEM
	5) TIMING MODE		5) CONTROL PORT
	6) SET LBO		6) IP ADDRESS
	7) INBAND LPBCK	ALARM REPORTS	7) SUBNET MASK
	8) BIT STUFFING	ALARM FORMATS	8) DEFAULT ROUTER
	9) TR-08 OPTIONS	BPV THRESHOLD	9) SLIP RATE
2) UNIT			A) SLIP FLOW CTL
			B) PROXY TRAPS
3) MAP XCHNG	OFF		
	AUTO		
4) MAP IN USE: A(B)		1) MAP A @:HH:MM	
		2) MAP B @:HH:MM	

3) CONFIG	5)DS0 MAP A	1) COPY A > TEMP	
		2) CREATE TEMP	1) DSO RATE
	6) DS0 MAP B	3) REVIEW MAP A	2) TX CLK CNTRL
	1) COPY B > TEMP	4) REVIEW TEMP	3) DATA
	2) CREATE TEMP	5) EDIT TEMP	4) CTS
	3) REVIEW MAP B	6) APPLY TEMP > A	5) DCD
	4) REVIEW TEMP		6) DSR
	5) EDIT TEMP	0.1 Nx56/64 Config	7) "0" INHIBIIT
	6) APPLY TEMP > B		8) INBAND MODE
	7) PORT CONFIG	Nx56/64 (0.1)	9) TX CLK SOURCE

THIS SECTION APPLIES ONLY TO THE TSU 120e

| | DBU Config | 1) BACKUP MODE | |
		2) BACKUP ON	
		3) PATTRN VERIFY	
02. DSX-1	1) FORMAT	4) BACKUP DELAY	
(OPTION PORTS)	2) CODE	5) RESTORE DELAY	
	3) YELLOW ALARM	6) RETRY DELAY	
	4) LINE LENGTH	7) NUM RETRIES	
	5) INBAND LPBACK	8) BACKUP TESTING	1) BACKUP TEST
	6) ROB BIT SIGNL	9) WKEND LOCKOUT	2) TEST HOUR
		A) ENABLE HR	3) TEST DAY
		B) DSABLE HR	
		C) TRAP IN DBU	

Figure 5-1. Complete Configuration Menu

NETWORK (NI)

This menu item accesses the configuration of parameters asso-
ciated with the network interface in the base unit. There are
nine submenu items that include setting the format, the line
build out (LBO), and the timing mode. Submenu items do not
include setting the parameters which may be necessary for a
secondary interface (DSX-1 Passthru, etc.).

Network (NI) Menu Items

The menu items are:

Menu Item	Description
FORMAT	Sets the frame format for the NI. Choices: D4, ESF, and SLC96 NOTE *D4 is equivalent to superframe format (SF).*
CODE	Sets the line code for the NI. Choices: AMI and B8ZS.
YEL ALARM	Enables and disables the transmitting of yellow alarms. Choices: ENA and DISA.
XMIT PRM	Enables and disables the sending of PRM data on the facility data link (FDL). The PRM data continues to be collected even if **XMIT PRM** is disabled (possible only with ESF Format). Choices: Off and On.
TIMING MODE	Selects the clock source for transmission toward the network from the NI. See *TSU 120 Clock Sources* on page 5-5 for more information Choices: Network, DTE (Slot 1), Normal (CSU), U-BR1TE (Slot 1), Internal, Secondary (SI).

Menu Item	Description
SET LBO	Selects the line build out for the network interface. In **AUTO MODE**, the TSU 120 sets the LBO based on the strength of the receive signal and displays the selected value. Choices: 0.0 dB, 7.5 dB, 15 dB, 22 dB, Auto. **NOTE** *In order to activate the -36 dB receiver sensitivity, the LBO should be set to* **AUTO**. This feature is useful in a point-to-point application where no network elements are involved. If a network element such as a Smart Jack is installed on the circuit, the LBO should be set to 0 dB.
INBAND LPBCK	Sets unit to accept or reject the network interface loop-up and loop-down codes as defined in ANSI T1.403. Choices: Accept, Reject.
BIT STUFFING	When enabled, bit stuffing causes the TSU 120 to monitor for ones (1s) density violations and insert a one (1) when needed to maintain 1s at 12.5 percent. Choices: Enable, Disable.
TR-08	The TR-08 submenu configures the unit for TR-08 applications. The submenu items and their descriptions follow. **Alarm Report** Enables and disables the transmitting of alarm reports. Choices: SEND ALARMS, DISABLE ALARMS **Alarm Format** Sets the alarm frame format to 13 frames or 16 frames. Choices: ORB-13, ORB-16 **BPV Threshold** Sets the threshold for BPVs to trigger an alarm. Choices: 10-4, 10-5, 10-6

TSU 120 Clock Sources

The TSU 120 is operable from various clock sources permitting it to perform properly in many different applications. Set the network interface clocking options with the clocking options set by the Network (NI) Configuration menu options.

The following clock source options are available:

• Network
• Base DSX-1 Timing
• DTE Timing
• Internal Timing
• Secondary Timing
• Normal (CSU) Timing
• U-BR1TE

NOTE

The selected clock option always designates the clock source for transmission. Clocking necessary for receiving data is always recovered from incoming data.

Network Timed

The network is the source of timing. The received data clocking is looped back to the network where it is used to determine the transmission timing. This option is also referred to as loop timed as the transmission clock is derived from the received clock. See *Figure 5-2*.

.
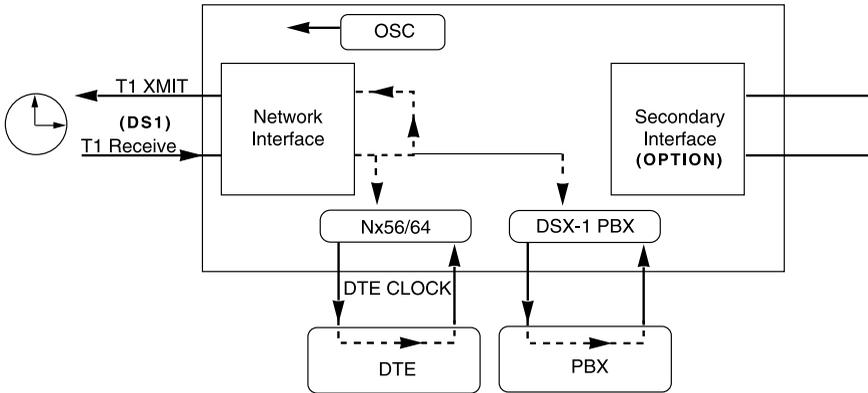
Figure 5-2. Network Timed Clock Source

Base DSX-1 Timing

The PBX is the source of timing. The TSU 120 uses the clock derived by the Base DSX-1 interface for transmission timing. See *Figure 5-3*.
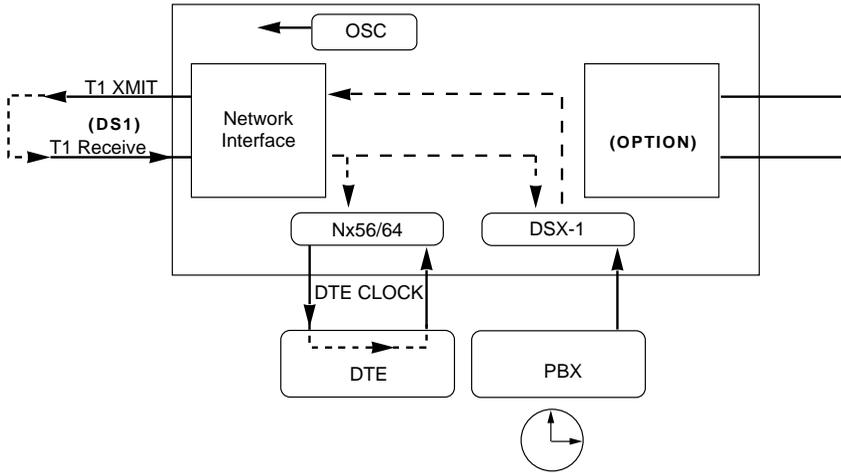

Figure 5-3. DSX-1 Timed Clock Source

DTE Timing

The DTE is the source of timing. The TSU 120 uses the incoming DTE clock to determine the transmission timing. This is typically used in applications where it is necessary to have the DTE as the primary clock source, (such as limited distance line drivers). See *Figure 5-4*.
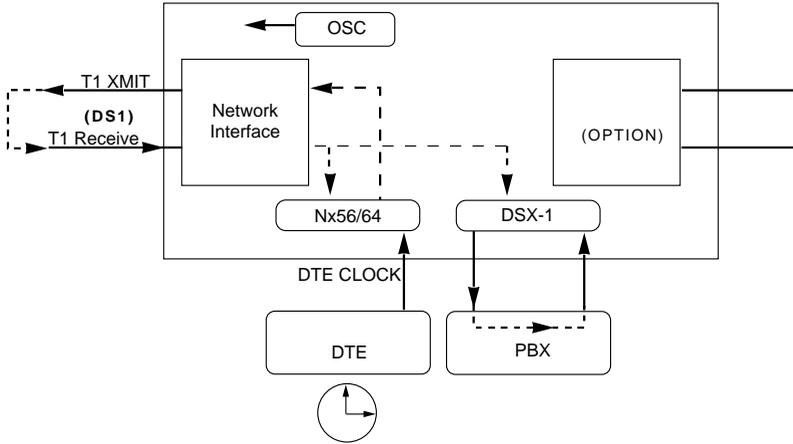
Figure 5-4. DTE Timed Clock Source

Internal Timing

The TSU 120 is the source of timing. The TSU 120 is configured to use its own internal oscillator as the source of timing. Applications include private line driver circuits where one end is set to network and the other to internal. See *Figure 5-5*.
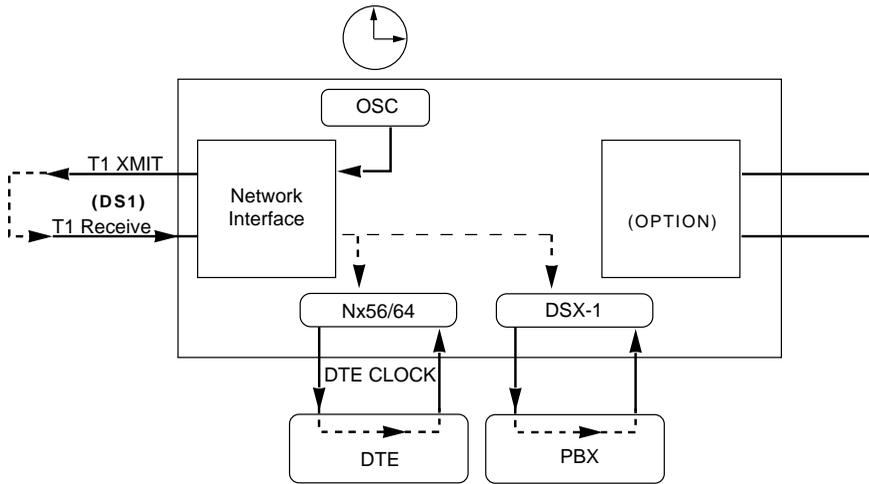
Figure 5-5. Internal Clock Source

Secondary Timing

The secondary interface is the source of timing. The TSU 120 uses the clock derived by the secondary interface for transmission timing and the receive signal timing. See *Figure 5-6*.

NOTE *Either a DSX-1 Option Module or a Drop and Insert Option Module must be installed in the TSU 120 for this mode to function.*
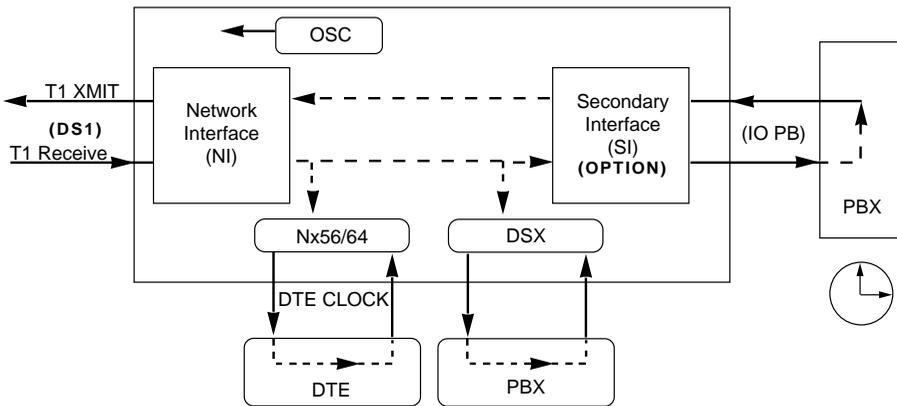
Figure 5-6. Secondary Timing

Normal (CSU) Timing

In the Normal (CSU) Timing mode, the Receive Clock is derived from the Network Interface while the Transmit Clock is derived from the PBX or other alternative timing source, connected to the Secondary Interface (e.g., Drop and Insert or DSX-1). See *Figure 5-7*.

This timing option is the same as that typically used for CSUs. This is the preferred mode for use with a PBX application.
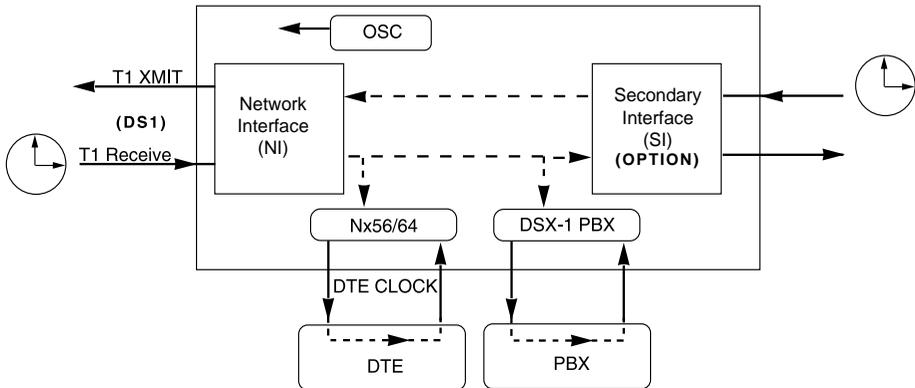
Figure 5-7. Normal (CSU)

NOTE   *The network interface and secondary interface clocking options are set by using the Network (NI) Configuration menu options. Either a DSX-1 Option Module or a Drop and Insert Option Module must be installed in the TSU 120 for this mode to function.*

U-BR1TE

The U-BR1TE timing selection works like Normal (CSU) except that timing is derived from the U interface on port 1.1.

Unit Menu

The Unit menu changes the baud rate of the chain in port and the setup of the dial out port. The menu items are:

Menu Item	Description
CTL PORT RATE	Sets the baud rate for communication with the PC or modem. Choices: 1200, 2400, 9600, 19200, and 38400 kbps
TRAPS	Enables or disables the transmission of trap messages. Choices: Enable, Disable
ACCESS	Sets the method of connection from the TSU 120 to T-WATCH Pro/SNMP Choices: Direct - Used if connected directly to the PC. Dial - Used when connection is through a modem. The dial string is entered from T-WATCH Pro/SNMP.
INIT MODEM	Allows you to choose an industry standard or a custom initialization string for a modem connected to the control port. Choices: Industry Standard, Custom Initialization String
CONTROL PORT	Selects the TCP/IP physical interface; Normal, using the 10BaseT Ethernet or SLIP using the EIA-232 serial port (10BaseT is only available in the TSU 120e). Choices: Normal, SLIP **NOTE** *If this option is set to SLIP, the EIA-232 port may not be used as a terminal interface.*

Menu Item	Description
IP ADDRESS	This is the IP address that uniquely identifies the TSU 120 on a TCP/IP network. This address is composed of four decimal numbers, each in the range of 0 to 255, separated by periods. This value is used for either the 10BaseT Ethernet or SLIP interface, depending on the IP interface setting (10BaseT is only available in the TSU 120e).
SUBNET MASK	This defines which part of a destination IP address is the Network number. It is used along with the TSU 120 IP address to determine which nodes must be reached through the default IP Gateway. This value is ignored when the IP interface is set to **SLIP**.
DEFAULT ROUTER	All IP Packets destined for nodes not on the TSU 120 unit's local network are not forwarded through this IP address. Normally, this address defines a router connected to the TSU 120 unit's local network. This value is ignored when the IP interface is set to **SLIP**.
SLIP RATE	This sets the baud rate for the Chain-In port when used as the SLIP connection for SNMP management. Choices: 1200, 2400, 4800, 9600, 19200, 38400 Kbps
SLIP FLOW CTL	This is used to activate flow control on the Chain-In port when used as the SLIP interface. Hardware mode uses RTS and CTS. Choices: None, Hardware
PROXY TRAPS	This determines whether or not traps will be forwarded from units being "proxied" for. Choices: Enable, Disable

Map Exchange (Map Xchng)

The **MAP EXCHANGE** menu enables and sets the automatic time of day map switch. The unit provides selection of the hour, minute, and seconds for the map switching to take place.

The menu items are:

Menu Item	Description
OFF	Indicates the map in use does not change (disabled).
AUTO	Indicates that the map in use will change at a user-selected time of day (enabled).

1. Scroll to select **AUTO** to enable or **OFF** to disable the Automatic Map Change feature.
2. Press **Enter** to activate the selection.
3. When **AUTO** is selected, the unit displays the screens to set times for switching.
4. After editing Map A, press **Enter** to record the Map A settings and activate the selection fields for Map B.
5. Use the same operation to edit switching time for Map B.

When ESF is used with an FDL channel between units, the units automatically coordinate the automatic map switch by sending a map switch command from end-to-end over the FDL. Only one end needs to be set to Auto for this to work.

Map In Use: A(B)

The **MAP IN USE** menu item controls the DS0 map the TSU 120 uses and displays the map in current use.

DS0 Map A and DS0 Map B

The DS0 maps designate which DS0s are assigned to which port. See *Figure 5-8*. There are three maps, **DS0 MAP A**, **DS0 MAP B**, and the **TEMPORARY (TEMP) MAP**.
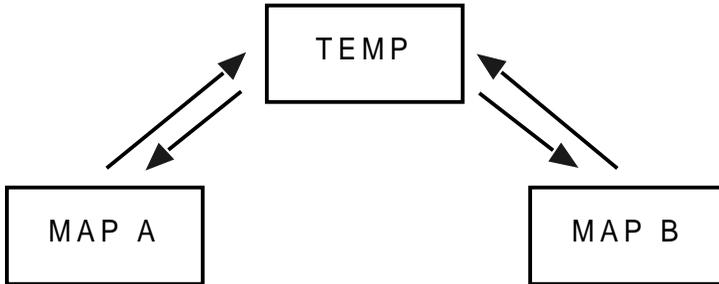

Figure 5-8. DS0 Map Designations

Map A and Map B are the current maps the TSU 120 uses. The Temp map generates a map before putting it into use.

You can copy Map A to Map B by copying the Map A into the TEMP map. Then apply (write) the TEMP map into Map B.

The menu items are:

Menu Item	Description
COPY A (B) >TEMP	This copies the current map (A or B) into a Temp Map area. This permits modification without disturbing the existing map. When the modifications are completed, the Temp Map is written to current **MAP A (B)** by selecting **Apply**.
CREATE TEMP	This creates a map by defining a port or Idle for all DS0s. When **CREATE TEMP** is first selected, all DS0s are set to **Idle.** See *DS0 Map Example* on page 5-16 for more information.
REVIEW MAP A(B)	Permits a quick review of the number of DS0s assigned to each port and the number of unassigned DS0s (**Idle or TST**) as defined in the currently applied Map A(B).

| Menu Item	Description
REVIEW TEMP	This menu item is operated the same for the Temp Map as is **3)REVIEW MAP A** or **MAP B**.
EDIT TEMP	The map in the Temp file can be edited to whatever configuration is desired. If Map A had been copied into the Temp file, then after editing, the Temp file could be applied to **MAP A** or **MAP B**. The menu operation is identical to **2) CREATE TEMP** with the exception that the existing port selections display.
APPLY TEMP> A(B)	Writes the Temp map into **MAP A**. **Apply** is usually the last step in updating a map and is accessed automatically at the end of editing or creating a temporary map. Currently, it can be bypassed by selecting another menu choice.

DSO Map Example

A sample selection follows:

DS0: 01 to 24
PORT: IDLE, TST, + option module ports

TST designates which DS0s are used for QRSS testing when activated under the **TEST MENU**. When not used for testing, the TST designation is identical to **Idle**.

With the cursor on **CREATE TEMP**, press **Enter**. The unit displays the selection screen with the cursor positioned on the first selection DS0 number. See *Figure 5-9*.

Select DS0 Number

```
DS0:01
PORT:1.1 NX56/64
```

Select Port
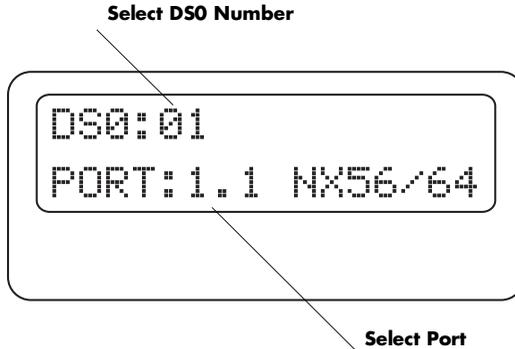
Figure 5-9. Create Temp Selection Screen

1. Use either the **Arrow Keys** or **Numbers** to enter the DS0 number (do not mix the use of the keys).

2. Press **Enter** to complete the selection and move the cursor to Port, the next field.

3. Scroll to select the port which is dependent on the installed option card.

4. Press **Enter** to complete the selection and move the cursor back to the DS0 field.

5. With the cursor on the DS0 field, the DS0 number can be incremented or decremented by scrolling.

6. Press **Copy** to place the contents of the last DS0 in the new DS0 number.

7. When all entries are complete, press **Cancel** to move the cursor to the last of the submenu choices, **6)APPLY**.

8. Either apply the newly created DS0 map or press **CANCEL** to return to the **DS0 MAP A (B)** submenu choices.

NOTE

*Selecting **Apply** will not disrupt the operation of unmodified ports.*

Port Configuration (Port Config)

Port Configuration selects and configures the parameters associated with any data port in the unit. For example, parameters for the DSX-1 (PBX) interface are set through this menu. The items that can be set depend on which option module is installed. The list of option ports will vary with the configuration.

The TSU 120 is designed so that any additional ports developed in the future will contain the appropriate menu selections to provide access by use of this menu item.

The Config menus for options ports are described in separate sections of the manual supplied with the option card.

0.1 Nx56/64 Port Configuration (Port Config) Menu Items

There are two major menu items under Nx/DBU configuration: **Nx56/64 CONFIG** and **DBU CONFIG**. Only the TSU 120e offers the DBU feature.

Nx56/64 Menu Items

Menu Item	Description
DS0 RATE	This sets the base rate of the interface. The actual data rate depends on the number of DS0s assigned to the Nx port. Choices: 56K, 64K
TX CLK CNTRL	Controls the clock used by the TSU 120 to accept transmit (TX) data from the DTE. The default is normal. If the interface cable is long, causing a phase shift in the data, the clock can be selected as Invert. This switches the phase of the clock which should compensate for a long cable. Choices: Normal, Invert

Menu Item	Description
DATA	Used to control the inverting of the DTE data. This inversion can be useful when operating with an HDLC protocol. Often used as a means to ensure 1s density. Choices: Normal, Invert NOTE *If **Invert** is selected, **zero (0) inhibit** should also be selected to prevent an open DTE input from placing zeros on the network.*
CTS	Used to control characteristics of CTS. Choices: Normal*, Force On *See Table 5-1 on page 5-20.
DCD	Data Carrier Detect. Indicates to the DTE when a valid signal is being received at the Network Interface. Choices: Normal*, Force On *See Table 5-1 on page 5-20.
DSR	Data Set Ready. This signal indicates to the DTE when the DCE is turned on and ready for operations. Choices: Normal*, Force On *See Table 5-1 on page 5-20.
0 INHIB	The Nx interface will detect an uninterrupted string of zeros (0s) being transmitted toward the network. If 0s are transmitted for >1 second, the TSU 120 will force 1s. Choices: On, Off

Menu Item	Description
INBAND MODE	The Nx56/64 port is capable of providing an inband communications channel (for T-Watch and SNMP) between units. This is accomplished by using 8 kbps of the first DS0 assigned to that particular Nx56/64 port. If in 56 K mode, no data bandwidth will be used. Inband must also be enabled at the destination port. Choices: On, Off, On Demand
TX CLK SOURCE	This controls the source of the clock used by the TSU 120 to accept transmit data from the DTE. The default is **INTERNAL**. If the application requires that the DTE device provides the clock with the transmit data, the **EXTERNAL** setting is used. Choices: Internal, External

Table 5-1.   Normal Mode of Operation

Signal	RTS	V.54 Loop-back	511 TST ON	Self Test Active	Netwk Test Active	No DS0 Mapped	Network Alarm
CTS	Follows	OFF	OFF	OFF	OFF	OFF	OFF
DCD	—	—	—	OFF	—	OFF	OFF
DSR	—	OFF	OFF	OFF	OFF	OFF	—
Where "—" = don't care							
*Until backup becomes active							

DBU Configuration Menu Items (TSU 120e only)

Menu Items	Description
BACKUP MODE	In a backup condition, both ends of the circuit must detect backup conditions before backup is activated. One DBU is set to **ORIGINATE** and the other to **ANSWER.** Upon a network failure, only the Originate DBU initiates backup by dialing the Answer end. Once called, the **Answer DBU** goes into backup mode only if a backup condition is detected. This is ideal for controlling where calls originate. Choices: Disable, Originate, Answer
BACKUP ON	Selects the conditions that cause the Nx/DBU to initiate Backup. **NET FAIL:** Backup occurs on **RED ALARM**, **YELLOW ALARM**, **BLUE ALARM**, and **LOS**. **NET/DATA FAIL:** Backup occurs on the same conditions as **NET FAIL,** plus loss of data transitions on the data the Nx56/64 receives from the network.
PATTRN VERIFY	Selects whether or not the DBU will use its pattern generator and receiver to authenticate backup attempts. When the local and remote units are both Nx/DBUs, set to **ENABLE**; otherwise set to **DISABLE**. Choices: Enable, Disable
BACKUP DELAY	Selects the time allowed to elapse between the network going into alarm or no data transmissions and the backup beginning. Choices: 1 sec, 3 sec, 10 sec, 30 sec, 1 min, 5 min, 10 min

Menu Items	Description
RESTORE DELAY	Selects the time that elapses between the network going out of alarm or data and the backup call being taken down. If **NEVER** is selected, the user must deactivate the backup mode. Choices: 1 sec, 3 sec, 10 sec, 30 sec, 1 min, 5 min, 10 min, never
RETRY DELAY	Selects the time between redialing the external DCE after failed dial attempts. Choices: 10 sec, 30 sec, 1 min, 5 min, 10 min
NUM RETRIES	Selects the number of times the DBU will attempt to redial if unable to connect. Choices: None, unlimited, 3 times, 10 times.
BACKUP TESTING	Selects the options for the automatic ISDN verification feature of the Nx/DBU. Verification of the backup circuit does not disrupt data on the T1. **BACKUP TEST**: Selects the frequency of automatic backup circuit verification by the DBU. Choices: Manual, Hourly, Daily, Weekly **TEST HOUR**: Selects the hour of the day the Backup test will occur. Choices: 0-23 **TEST DAY**: If Weekly Backup test is selected, selects which day to perform the test. Choices: Monday - Sunday
WKEND LOCKOUT	If no backup is desired from midnight Friday to midnight Sunday, set this selection to **ON**; otherwise set to **OFF**. Choices: On, Off

Menu Items	Description
ENABLE HR	The hour backup will be enabled. Enter from the numeric keyboard. Choices: 0-23
DISABLE HR	The hour that the backup will be disabled. Enter from the numeric keyboard. Choices: 0-23 NOTE *For these items to function properly, verify that the time and date in the TSU are set correctly. See Chapter 6, Utility Menu, Time/Date section.*
TRAP IN DBU	If traps are enabled , this parameter will send either a single trap upon going into a DBU session or send repeated traps for the duration of the DBU session. Choices: Single, Repeated

0.2 DSX-1 Port Configuration (Port Config) Menu Items

The menu items are:

Menu Items	Description
FORMAT	**FORMAT** sets the frame format for the base DSX-1 interface. Choices: D4, ESF
CODE	**CODE** sets the line code for the base DSX-1 interface. Choices: AMI, B8ZS
YELLOW ALARM	**YEL ALARM** enables and disables the transmitting of yellow alarms. Choices: Enable, Disable

Menu Items	Description
LINE LENGTH (FT)	**LINE LENGTH** provides selection of the proper output level for the base DSX-1 based on the length of the interface cable. Choices: 1-133 ft, 133-266 ft, 266-399 ft, 399-533 ft, 533-655 ft, -7dB
IN-BAND LOOPBACK (INBAND LPBACK)	**IN-BAND LOOPBACK** sets the base DSX-1 to accept or reject in-band loopup or loopdown codes (per ANSI T1.403 specification) which may be sent to the card over the DSX-1 interface. This loopback is a line loopback. Choices: Accept, Reject
ROBBED BIT SIGNALING (ROB BIT SIGNL)	This menu option is used to enable/disable robbed-bit signaling. Whenever the base DSX-1 interface is connected to terminal equipment (i.e., PBX/SW56) for voice or dialed data services, this option should be enabled. The only exception is when the terminal equipment is using a form of common channel signaling (i.e., PRI). For applications requiring robbed-bit signalling as well as a messaging channel (i.e., some proprietary PBX channels), the **ON:DSOs 1-23** selection is provided. Choices: OFF, ON: ALL DSOs, ON: DSOs 1-23

Chapter 6   Utility Menu

The **UTILITY MENU** tree displays and sets system parameters (see *Figure 6-1* on page 6-2). This includes:

• setting the time and date,

• resetting all parameters to factory values, or

• re-initiating the unit.

This menu also displays the unit software revision and the Unit ID setting.

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, press **Cancel** to return the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the **MAIN MENU**.

| | 1) TIME/DATE | TIME: HH:MM:SS | |
| | | DATE: MM/DD/YY | |

| | 2) FACT RESTORE | (Returns all configurations to factory settings) | |

| 3) UTIL | 3) SET PASSCODE | NEW PASSCODE | VERIFY PASSCODE |

| 4) UNIT ID |

| 5) SOFTWARE REV | (Displays Current Software Revision |

6) PORT UTILITY	0.1 Nx56/64
	0.2 DSX-1
7) ENET ADDRESS	(OPTION PORTS)

| 8) SERIAL NUMBER |

| 9) CMD MODE |
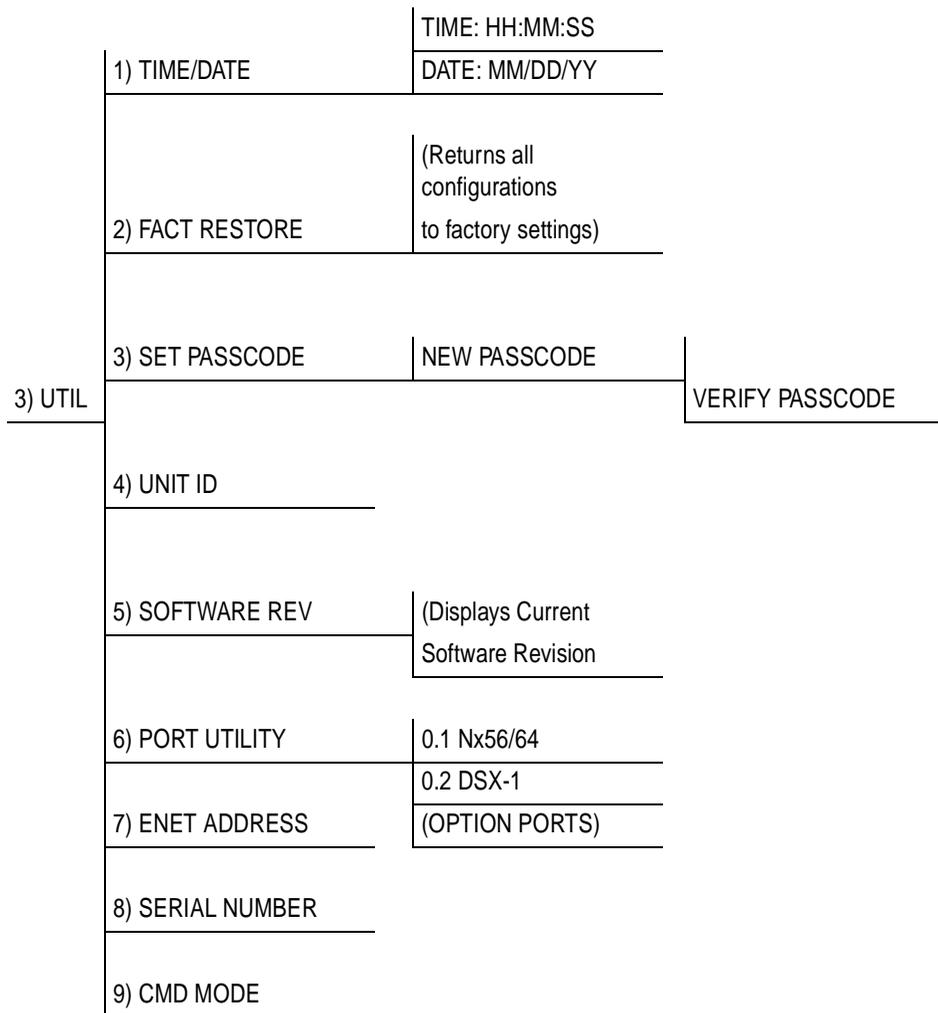
Figure 6-1. Complete Utility Menu Tree

Time/Date

This menu option displays or edits the current time and date. The TSU 120 maintains the time and date during power-off conditions.

If you want to...	Do this...
Record the entry and move to the next editing position	Press **Enter** after any numeric change
Move to a different field to edit	Press **Enter** at the editing position without making any changes, or Use the **Up** and **Down Arrow keys**
End the editing process	Press **Cancel**

Factory Restore (Fact Restore)

This menu item restores the factory default settings for all unit parameters, including configured DS0 maps.

Set Passcode

Enter Passcode from Other Menus

The Passcode prompt may make an unexpected appearance from other menu operations. This happens only when the unit is operating in the limited access mode, i.e., without an active passcode. The limited access mode may become active even if a passcode was entered as it does when there is no activity for ten minutes.

If the unit is to be remotely accessed using T-WATCH Pro, a passcode must be entered. When managing a number of units, the passcode can be the same for all.

The unexpected appearance of the Passcode prompt occurs, for example, while operating in a limited access mode and attempting to change the Data Rate, **(2)CONFIG, 2)UNIT, 1)CTL PORT RATE, 1)DATA RATE**. Use the **Number Keys** to enter the correct passcode and press **Enter**. The unit displays **ACCESS GRANTED**.

Pressing any key after entering a passcode causes the unit to return to the previous active menu. In this case it returns to **2)CONFIG, 2)UNIT, 1)CTL PORT RATE,** to permit changing the data rate.

Change/Set a Passcode

The passcode can be changed or set at any time or eliminated altogether through the Utility Menu item **3)SET PASSCODE**. This procedure requires the current passcode (if one is established) for operation.

The passcode can only be entered by using numbers. After entering the desired passcode, press **Enter**.

Set a null passcode at the **3)SET PASSCODE** menu by pressing **Enter** without any numbers. This sets a null passcode and grants unlimited access.

Passcode Automatic Time-out

For added security protection the unit is equipped with an automatic time-out for operation with the password. After ten minutes of inactivity, the unit reverts to limited access operation. To make changes in the configuration, the passcode can be reentered.

If the passcode number is lost, contact ADTRAN Customer Service for assistance.

No Passcode Desired

At the **NEW PASSCODE** prompt (in the Set Passcode menu), press **Enter** without any numerical entry. The system nullifies the need to enter a password for subsequent use and proceeds to the **UNIT ID** prompt.

Unit ID

This menu is used to access the current Unit ID setting. Viewing is available in limited-access mode. Editing or changing the Unit ID requires the use of a password, as in editing mode. Unit identification numbers must be between **2** and **999**.

If an out-of-range number is entered, the unit assumes the upper limit number of **999**.

Set the Unit Identification

In the **UNIT ID MENU** (item 4) under the **UTIL MENU**, enter any value between **2** and **999**. The number **1** is reserved for the PC.

Press **Enter** to record the Unit ID number and to establish its availability for operation by remote control. The unit proceeds to the **SET CONTROL PORT** prompt.

No Unit ID Desired

Press **Enter** at the **UNIT ID PROMPT** without entering any numbers. The unit will not be able to be operated by remote control.

Software Revision (Software Rev)

This menu provides access to the display of the current software revision level loaded into the base unit controller. This information is required when requesting assistance from ADTRAN Customer Service or when updates are needed.

Press **Cancel** to exit.

Port Utility (Option Ports)

This menu provides access to the display of the current software information for each port installed in the unit. This information is required when requesting assistance from ADTRAN customer service or when updates are needed.

ENET Address (TSU 120e only)

Displays the Ethernet address for the 10BaseT port.

Serial Number

Displays the serial number of the unit.

CMD Mode

Reserved for factory use.

Chapter 7   Test Menu

The **TEST MENU** initiates different types of unit tests and displays test results in the LCD window. The **TEST MENU** contains four items (see *Figure 7-1 on page 7-2*).

Executing tests will disrupt some of the normal operation. See individual menu items concerning tests before executing.

Menu flow is normally depicted from left to right. Arrows on the lower right of the screen indicate the scrolling direction to view additional menu items. At every level of the menu, pressing **Cancel** returns the system to the previous menu level. Pressing **Cancel** repeatedly returns the system to the **MAIN MENU**.

		LINE ON	
	1) LOCAL LOOPBCK	PAYLOAD ON	
		NO LOOPBACK	ATT INBAND LLB
1) NETWORK TESTS			ANSI FDL LLB
	2) REMOTE LOOPBK		ANSI FDL PLB
			FT1 LPBK
			NO LOOPBACK
		ALL ZEROS	
	3) TEST PATTERN	QRSS ALL DS0S	
5) TEST		QRSS TST DS0S	
		ALL ONES	
		NONE	
	4) PATTERN RESULT	(Displays results)	
2) RUN SELFTEST	(Displays results)	1) DTE LOOPBACK	
		2) 511 PATTRN	
3) PORT TEST	Nx56/64 (0.1)	3) 511 RESULTS	(displays results)
		4) DBU LOOPBACK	TESTS OFF
4) CANCEL TESTS		5) DBU TEST	INTERFACE TST
			FORCE BACKUP
		6) DBU DATA /CNTRL	(displays results)
		7) DBU TST RESULT	(displays results)
		This section applies to the TSU 120e only	
	0.2 DSX-1		1) LOOPBACK
	(OPTION PORTS)		
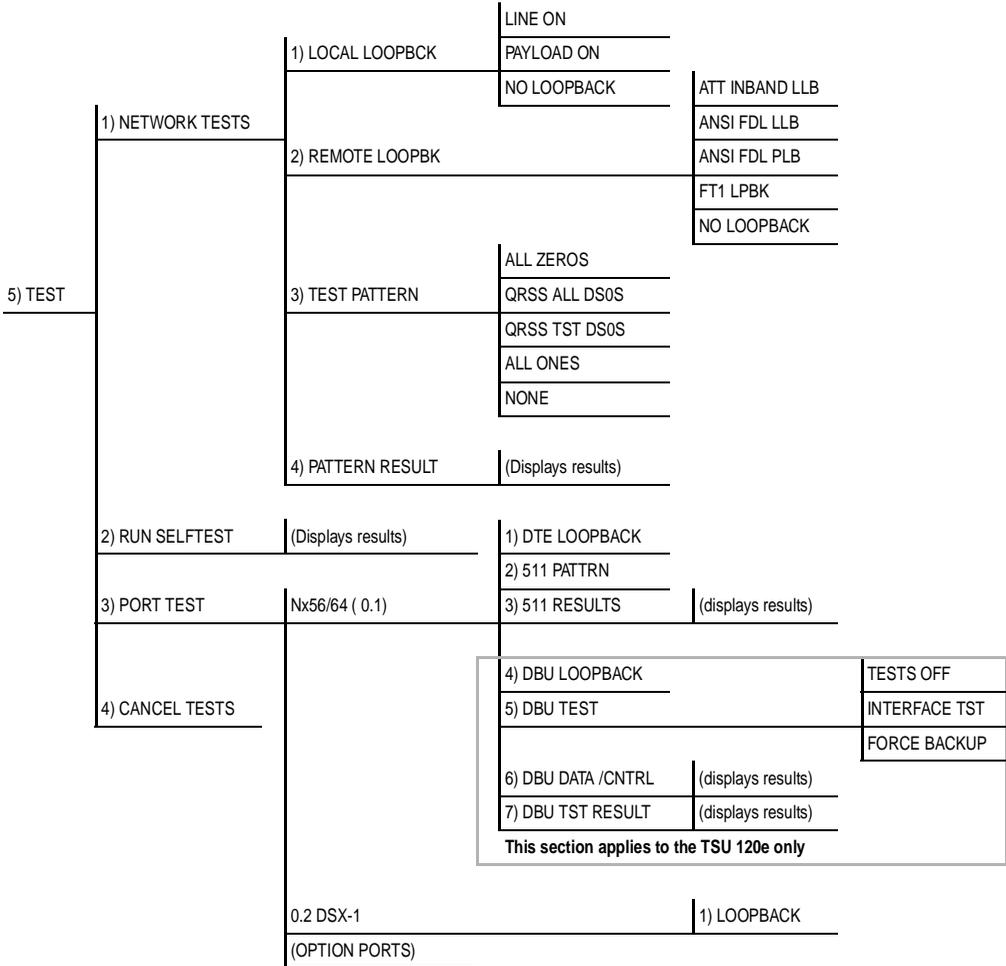
Figure 7-1. Complete Test Menu Tree

Network Tests

Network tests control the activation of loopbacks and the initiation of data test patterns.

Network tests are run on the Network Interface (NI). You can select three different test configurations to determine the type of loopback and the pattern to run. Test results display in the LCD window.

Executing **NETWORK TESTS** will disrupt normal data flow unless only **TST DS0S** are selected for testing.

Loopback Tests

A number of different loopbacks can be invoked locally from the front panel, by T-Watch commands, or remotely by using special in-band codes (AT&T D4 network loop-up and loop-down codes). Additionally, the loopbacks can be remotely controlled by means of out-of-band commands by the **T1 ESF FDL** or from T-WATCH Pro by a modem connection.

Network Interface Loopbacks

Network interface loopbacks (see *Figure 7-2 on page 7-4*) affect the entire T1 data stream. There are two types of network loopbacks, **LINE LOOPBACK** and **PAYLOAD LOOPBACK**.

Line Loopback

Line loopback loops all of the received data back toward the network. The transmitted data is the identical line code that was received, including any bipolar violations or framing errors.

Payload Loopback

Payload loopback is similar to line loopback, except that the framing is extracted from the received data and then regenerated for the transmitted data.
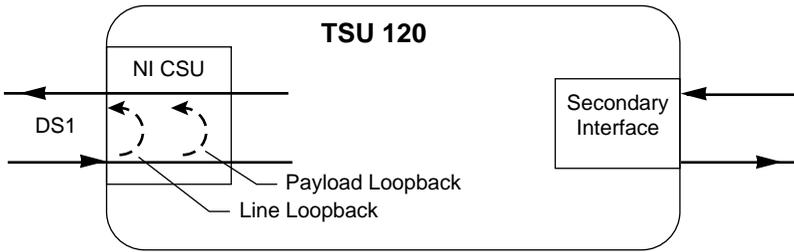
Figure 7-2. Network Loopback Tests

LOCAL LOOPBCK

There are three available choices for setting the local loopback:

LINE ON   Activates the line loopback

PAYLOAD ON   Activates the payload loopback

NO LOOPBACK   Deactivates the loopback

Using the arrow keys, select a setting and record it by pressing **Enter**. The unit returns the display of **1) LOCAL LOOPBCK** and **2)REMOTE LOOPBCK**

REMOTE LOOPBK

This activates the same loopbacks as Local Loopback but at the far end. It uses either the inband loop-up code as specified by ANSI T1.403 for line loopback (ATT In-Band LLB), or the FDL as specified in ANSI T1.403 for payload and line loopback codes. The following options are available:

ATT IN-BAND LLB   Activates the line loopback using inband code

ANSI FDL PLB   Initiates the transmission of an FDL payload loopup code toward the far end

ANSI FDL LLB   Initiates the transmission of an FDL line loopup code toward the far end

FT1 LPBK	Initiates the transmission of a FT1 loopback using the inband code described in T1.403.
NO LOOPBACK	Deactivates the loopback

NOTE *Remote Loopback can only be used with Fractional T1 if the **ANSI FT1 LLB** is selected.*

After a Remote Loopback option is selected, the TSU 120 verifies that the far end is actually in a loopback by checking for the receipt of a code looped back from the far end. Once the Remote Loopback type is selected, the LCD displays the loopback progress by displaying **LOOPING** until loopback is verified.

Test Patterns

All Zeros

Sends an all zeros pattern to the network.

All Ones

Sends an all ones pattern to the network.

QRSS Pattern

The QRSS pattern is commonly used to simulate real data in T1 interfaces. This pattern can be assigned to appear in all DS0s or only in TST DS0s. When QRSS is set in all DS0s and one of the network loopbacks previously described is activated at the far end, a total end-to-end integrity check can be run without the need for any external test equipment. When QRSS is assigned to TST DS0s, an integrity check of the link can be run along with normal data flow. The TST DS0s are user-assigned as part of the DS0 Map. This sets the pattern for the test and initiates the transmission of the pattern. The test is terminated by selecting **NONE**. The following patterns are available:

QRSS ALL DS0S	Generates a QRSS test pattern and inserts the pattern into all DS0s
QRSS TST DS0S	Inserts a QRSS pattern in those DS0s mapped as TST in the currently active map (A or B)
NONE	Terminates pattern generation

NOTE *QRSS always runs at 64K/DS0.*

Example

1. Select **QRSS ALL DS0s** by using the **Arrow Keys**.
2. Press **Enter** to record the selection. The TSU 120 starts to generate a QRSS test pattern and inserts the pattern into all DS0s.
3. To end the test, select **NONE**.

PATTERN RESULT

Displays the results of the test currently active. Leaving and returning to this menu item does not interrupt the test.

Pressing **2** injects errors into the test pattern. These errors are detected by the device performing the pattern check.

ES	The number of seconds with at least 1 bit error.
BES	The number of seconds with more than 1 bit error and less than 320.
SES	The number of seconds with more than 320 bit errors.
SYNC	Indicates if pattern sync is (yes) or is not (no) valid. An asterisk (*) indicates if pattern sync has been lost since the start of testing.

Press **Shift+9** to clear results. The results are accumulated until the test pattern is set to **NONE** or **CLEARED**.

Using TST DS0s for testing can be very useful, particularly in Fractional T1 applications. You can run an end-to-end test on the Fractional DS0s by:

1. Setting for Map B the TST in the same DS0 as used by Map A to receive data from an Nx/DBU port, and
2. Looping the far end using a V.54 loopback code on the Nx/DBU port (DBU is TSU 120e only).

In addition, a single DS0 can be used for continuous testing while other DS0s are passing normal data. This will also provide an end-to-end check on the entire link. Set each end to send QRSS in TST DS0s (using 1 DS0) and occasionally view the results on the **PATTERN RESULT** menu selection.

Run Self-test

The self-test checks the integrity of the internal operation of the electronic components by performing memory tests and by sending and verifying data test patterns through all internal interfaces. Although actual user data cannot be passed during these tests, the self-test can be run with the network and DTE interfaces in place and will not disturb any external interface.

The memory portion of the self-test automatically executes upon power-up. A full self-test can be commanded from a front panel menu or from T-WATCH Pro.

In addition to the specified self-tests, background tests are also run on various parts of the internal electronics. These run during normal operation to confirm continued correct functioning.

This menu selection is used to execute a full internal self-test. The results of the self-tests are displayed in the LCD. Upon invoking the command, the LCD displays **SYSTEM SELF-TEST** and the test LEDs are illuminated. Test failures are displayed in the LCD window.

The self-test consists of the following tests:

BOARD LEVEL TESTS Each of the TSU 120 boards contain an on-board processor which executes a series of tests checking the circuitry on the board.

- RAM tests; EPROM checksum
- DS0 map tests
- On-board data path; sending a known test pattern through an on-board loop

UNIT LEVEL TESTS
- Front panel LED verification
- Phase Lock Loop verify
- Board-to-board interface test

A test pattern is sent from the controller through a loopback on all other boards and is checked on the controller. This verifies the data path, clocks, and control signals.

If a failure is detected, note the failure number and contact ADTRAN Technical Support.

CAUTION   *Executing the self-test will disrupt normal data flow and prevent remote communication until it is complete.*

Port Tests

The Port Tests menu is used to activate testing of specific data ports. It controls the activation of loopbacks and the initiation of data test patterns. Test results are displayed in the LCD window.

NOTE   *Port tests execution will disrupt normal data flow in the port being tested.*

Port Test Menu Items for 0.1 Nx56/64

0.1 Nx56/64 is the base Nx interface. It offers the following test functions:

DTE LOOPBK

This initiates a loopback. The following options are available:

PRT/LCL	The Nx port activates both a Local loopback (back toward the DTE) and a Port loopback when either is invoked.
REMOTE	The remote loopback causes a V.54 code to be sent to the far end. The Nx at the far end activates a PORT/LCL loopback upon detection of the V.54 code.
OFF	The loop is deactivated.

NOTE *The TSU 120 checks the remote loopback activation by detecting a proper response from the remote end. While waiting for the response, the display shows Looping. If successful, the display changes to LOOPED-UP. If unsuccessful, the display shows FAILED.*

511 PATTERN

This activates the generation of the 511 test pattern. The following options are available:

ON	The pattern check circuitry is enabled and a test started. The test is ended by selecting OFF.
OFF	The pattern generation and check is disabled.

511 RESULTS

This displays the results of the 511 test indicated in the 511 option. The results are in the form of the number of errored seconds. The error count can be cleared by pressing **Clear (Shift+9)**.

DBU Loopback (TSU 120e only)

ON   Initiates a loopback from the DBU towards the external DCE

OFF   Terminates the loopback test

DBU Test (TSU 120e only)
This selection is used to force a backup to occur even if a backup condition does not exist.

Test Name	What it does...
TEST OFF	Turns off DBU tests
FORCED BACKUP	Forces a backup regardless of time-of-day lockouts or network conditions
INTERFACE TEST	Causes the external DCE to dial its stored number. After the connection is established, the DBU sends a test pattern to verify the backup network. This test does not disrupt data or the primary network.

DBU DATA/CNTRL (TSU 120e only)
Allows status of DCD and RI to be monitored while the **INTERFACE TST** is on. If the dial-up network is correctly configured and dialed up, there should be an asterisk (*) over DCD.

DBU TST RESULT (TSU 120e only)
When an interface test is active, this screen will show the total number of **DATA BLOCKS** received and the number of blocks with errors.

Port Test Menu Items for 0.2 DSX-1

Loopback
Loopback activates the loopback function on the base DSX-1 interface. The available loopbacks are Port Loopback (towards the NI) and Line Loopback (towards the PBX or other terminal equipment).

Cancel Tests

Use this menu selection to deactivate all active tests, including tests on option modules.

Chapter 8 Telnet/Terminal Menus

MAIN MENU

The **TELNET/TERMINAL MAIN MENU** is the first menu displayed after the TELNET/Terminal session is established. See *Figure 8-1.* The default TELNET/Terminal password is ADTRAN.

NOTE *Only one TELNET/Terminal session may be active at a time.*

ADTRAN - TSU 120

Password: XXXXXXXX

Main Menu

 1) Status
 2) Config
 3) Util
 4) Test
 5) Remote Menu Access
 6) Management Config
 7) Flash Download
 8) Quit Session

Figure 8-1. Telnet/Terminal Main Menu

Status, Config, Util, and Test Menu Options

These menu items can access the same modified menus that you can access through the front panel. For detailed information on the available menu options, refer to the following sections:

- Status Menu on page 4-1
- Configuration Menu on page 5-1
- Utility Menu on page 6-1
- Test Menu on page 7-1

DS0 Maps Configuration Menu

The Telnet/Terminal version of the DS0 maps configuration menu takes advantage of the 24-line VT 100 display. Upon entering this menu, the current Temp (temporary) map displays and is followed by nine selections that you can use for configuring and reviewing map information. See *Figure 8-2*

```
                          TEMP MAP

      DS0#    PORT                    DS0#    PORT

      1       IDLE                    13      IDLE
      2       IDLE                    14      IDLE
      3       IDLE                    15      IDLE
      4       IDLE                    16      IDLE
      5       IDLE                    17      IDLE
      6       IDLE                    18      IDLE
      7       IDLE                    19      IDLE
      8       IDLE                    20      IDLE
      9       IDLE                    21      IDLE
      10      IDLE                    22      IDLE
      11      IDLE                    23      IDLE
      12      IDLE                    24      IDLE


      1) COPY MAP A TO TEMP MAP
      2) COPY MAP B TO TEMP MAP
      3) CREATE TEMP MAP
      4) REVIEWMAP A
      5) REVIEW MAP B
      6) REVIEW TEMP MAP
      7) EDIT TEMP MAP
      8) APPLY TEMP MAP TO MAP A
      9) APPLY TEMP MAP TO MAP B
```

Figure 8-2. DS0 Temp Map

You can use the **ARROW KEYS** or **Number Keys** to move the cursor from one selection to another. Use the **Enter Key** to perform the action displayed in the LCD to the right of the cursor.

Map Configuration

Map configuration consists of the following steps:

Step	Action
1	Initialize the Temp Map to one of three configurations: • Current Map A • Current Map B • All Idles This step is optional.
2	Edit the Temp Map so that it reflects the desired map configuration.
3	Replace the current DS0 Map A or Map B configuration with the Temp Map configuration.

Initializing the Temp Map

Upon entering the DS0 maps configuration menu, the Temp map reflects its last configured state.

If you want to...	Use these selections...
initialize the displayed Temp Map to one of three configurations.	**1 - 3**
initialize the Temp Map from its current configuration to one which reflects the currently stored Map A or B configurations, respectively.	**1 , 2**
initialize the Temp Map to an all IDLE state.	**3**

Editing the Temp Map

To edit the Temp Map, follow these steps.

Step	Action
1	To make additional changes to the Temp Map, use **Selection 7** to enter the Temp Map edit mode. **Explanation:** Upon entering this mode, the cursor location moves to DS0 number one in the DS0 field of the Temp Map. The cursor may be moved from one DS0 to another using the **Arrow Keys** until it is located at the DS0 number whose assigned port needs to be changed.
2	Press the **Enter Key** to move the cursor to the Port field
3	Use the **Arrow Keys** to scroll through the possible port selections.
4	Press the **Esc Key t**o restore the previous port assignment and return to the DS0 field.
5	Press the **Enter Key** to save the current selected port and return to the DS0 field. **Explanation:** Once the cursor is again located in the Temp Map DS0 field, pressing the **Esc Key** a second time, causes the cursor to return to **Selection 1** below the Temp Map display.

Applying the Temp Map

Once the Temp map reflects the desired configuration, use **Selections 8** or **9** to apply this configuration to Map A or B, respectively.

Reviewing Maps

Selections 4 through **6** give a summary of the number of ports assigned to Map A, Map B, and the Temp Map, respectively.

Remote Menu Access

This displays TELNET menus for a remote device (may be another TSU/TDU or any other ADTRAN product that supports TELNET via its EIA-232 chain port). After selecting this option, the user may:

1. Choose to connect to a device entered in the Unit Access Table or
2. Enter a Unit ID for a unit not listed in the Unit Access Table. **CTRL + X** terminates the session and returns to the TSU 120 Main menu.

Management Configuration

This menu sets management information, such as SNMP community names and trap destination addresses.

Unit Access Table

This menu creates and edits the Unit Access Table. This table stores the Unit ID, Passcode, and Unit Type for units connected via chain ports or connected remotely to the TSU/TDU (see *Unit Access Table on page 8-6*). An entry in the table is required only to support proxy SNMP MIB access or polling. For MIB access, an entry is required only if the unit's passcode is not the same as the Default Unit Passcode, or the unit is a single port TSU standalone.

NOTE

It is not necessary to have an entry in this table for a remote unit in order to TELNET to it or forward SNMP traps from it. In the TELNET case, the Remote Menu Access menu is selected from the Main Menu and a Unit ID is entered which may or may not be in the Unit Access Table.

Units accessed via T-WATCH Pro over TCP/IP use the Unit ID and passcode set by T-WATCH Pro running on the PC.

```
_____Unit Access _____

Unit ID              Passcode    Type            Polled    PollStatus
20                   DEFAULT     Standard        No
3                    0033        Standard        Yes       UP
6                    0095        TSU Stand Alone No
8                    0022        Standard        Yes       UP


1) Add New Unit
2) Modify Unit
3) Delete Unit
4) Default Unit Passcode         0022
5) OK
```

Figure 8-3. Unit Access Table

Add New Unit

This adds a new device to the unit access table.

- You must enter a device **UNIT ID**, **PASSCODE**, **UNIT TYPE**, and **POLLED FLAG**.

- Unit type can be **STANDARD** (which supports any TSU/TDU Multiplexer and the ISU 512) or **TSU STANDALONE** (a single port TSU with no option card slot).

- You may select a passcode of **0** to **9999** for each device or **DEFAULT**. This results in the default passcode being used (defined as 0022 in Figure 8-3).

- Traps are normally sent from the unit in alarm to the TSU 120. For units in the Unit Access Table that are not chained directly to the TSU 120 but are managed over Inband or the FDL, traps are not automatically forwarded.

- Polling must be enabled on the TSU 120 for these units in order to receive Traps on the NMS. The TSU 120 can be configured to poll selected units for traps by enabling the polled option when adding or modifying a unit entry.

Modify Unit

Allows **UNIT ID**, **PASSCODE**, **DEVICE TYPE**, and **POLLED FLAG** to be changed for an existing entry in the table.

Delete Unit

Deletes an entry in the table.

Default Unit Passcode

Sets the default passcode for all devices in the table that have passcodes set to **DEFAULT,** or for any unit not listed in the table.

OK

Returns to the Configure Agent menu.

SNMP Read Community

- SNMP Read Community Name defaults to **public**.
- NMSs using this community name have read access for all supported MIB objects, but do not have the ability to change MIB objects.
- This value must be set to the same value on both the TSU 120 and the NMS (OpenView®, etc.) in order for the NMS to have read access to MIBs supported by the TSU 120.
- This value must be a text string of 16 characters or less.

SNMP Read/Write Community

- SNMP NMS using this community name have full read/write access to all supported MIB objects (defaults to private).
- This setting must be the same value on both the TSU 120 and the NMS in order for the NMS to have read/write access to MIBS supported by the TSU 120.
- This value must be a text string that is 16 characters or less.

NOTE

To access other units external to the TSU 120 (proxied units) using an SNMP MIB browser, append a period and the Unit ID of the external device to the read only and read/write community name used in the MIB Browser; for example, public.4. See Appendix A, Understanding SNMP for more information.

SNMP Trap Community

This community name is used for all SNMP traps forwarded by the TSU 120. Traps received from daisy-chained units have a period and the Unit ID appended to the trap community name.

Host 1 Trap IP Address

The first of four entries for SNMP trap destination addresses. The TSU 120 forwards all SNMP traps to the IP address specified in this entry. If the address is set to the default value of 0.0.0.0, no traps are forwarded for this particular value.

Host 2 Trap IP Address

Defaults to 0.0.0.0. Second destination address for SNMP traps.

Host 3 Trap IP Address

Defaults to 0.0.0.0. Third destination address for SNMP traps.

Host 4 Trap IP Address

Defaults to 0.0.0.0. Fourth destination address for SNMP traps.

System Name

A text string that can uniquely identify an SNMP-managed node.

System Contact

A text string containing the name, phone number, etc. of the individual responsible for maintaining an SNMP-managed node.

System Location

A text string describing the physical location of an SNMP managed node (for example, **SECOND FLOOR PBX ROOM**).

Auth. Fail Traps Sent

(**DISABLED, ENABLED**: defaults to **DISABLED**)
When enabled, the TSU 120 issues an SNMP trap when any SNMP request is received with an invalid community name. Can be used for security purposes.

Poll Link Status Traps Sent

(**DISABLED, ENABLED**, defaults to **DISABLED**). When enabled, the TSU 120 sends an SNMP trap whenever a device configured to be polled fails to respond. When the device begins responding to polls, a poll link-up trap is sent. The format of the traps are defined in the agent MIB.

Ping IP Host

Allows the user to Ping a specific IP address.

Telnet/Terminal Timeout

The TSU 120 terminates a TELNET or Terminal session if no activity is detected for this length of time. Only one TELNET or Terminal session may be active at one time. This timeout prevents an unattended session from blocking interactive access to the agent. The default value is five minutes.

Telnet/Terminal Password

This option allows modification of the password required for entry into a TELNET or Terminal session. The default value is ADTRAN.

Exit

Returns to the TSU 120 Main menu.

Flash Download

The TSU 120 uses flash memory that allows software updates via the EIA-232 port. This menu selection allows you to manually perform a flash download using **XMODEM**. **T-FLASH** is also available to automate this process.

Quit Session

Terminates the TELNET/Terminal session.

Appendix A   Understanding SNMP

ABOUT SNMP

As local area network (LAN) environments became standard-
ized over the past ten years, multi-vendor equipment grew
with competition. It became necessary to manage the various
vendor equipment from a single control console. Thus, the
SNMP emerged as the standard for managing commercial
TCP/IP networks.

The term **SNMP** broadly refers to the message protocols used to
exchange information between the network and the managed
devices, as well as to the structure of network management
databases.

Basic Components

SNMP has three basic components: **Network Manager**, **Agent**,
and **MIB**.

Network Manager

This is a control program that collects, controls, and presents
data pertinent to the operation of the network devices. It
resides on a network management station.

Agent

This is a control program that responds to queries and com-
mands from the network manager and returns requested infor-
mation or invokes configuration changes initiated by the
manager. It resides in each network device.

MIB

This is an index to the organized data within a network device. It defines the operating parameters that can be controlled or monitored. When requesting the network manager to retrieve or modify a particular piece of information about a network device, the network manager transmits the request to that network device. The agent in that device interprets the incoming request, performs the requested task, and sends its response to the network manager. The network manager collects all the data from the various network devices and presents it in a consistent form.

Commands

Using SNMP Version 1, the network manager can issue three types of commands: **GetRequest, GetNextRequest**, and **SetRequest**.

GetRequest

This command retrieves a single item or the first in a series from a network device.

GetNextRequest

This command retrieves the next item in a series from a network device.

SetRequest

This command writes information to a network device.

Messages

The network device issues two types of messages: **GetResponse** and **Trap**.

GetResponse

This message is the response to a network manager **GetRequest** or **GetNextRequest** command.

Trap

This is an unsolicited message issued by a network device to report an operational anomaly or an alarm condition to the network manager.

These messages are typically encased within informational packets and transported over the LAN or WAN (wide area network).

TSU 120 SNMP Access

By default, SNMP MIB Browser access to the TSU 120 IP address with the configured community names, accesses the host. The TSU 120 can also act as an SNMP proxy agent for external units. To access MIB variables on externally chained devices, append a period and the Unit ID of the device to the Read and Read/Write community names. For example, if the Read community name configured in the TSU 120 is **public**, specifying **public.3** as the community name in the SNMP MIB Browser allows reading SNMP MIB variables from externally chained unit with a Unit ID of **3**.

If the external unit's passcode is not the default, an entry must be added to the Unit Access Table for **SNMP MIB** access. See the *Unit Access Table* on page 8-5, for more information. However, SNMP traps for the unit can be forwarded without the entry.

SNMP Trap Configuration

Traps received by the TSU 120 from external units and the host unit are converted into SNMP traps and forwarded to the configured NMS. The source of the trap is uniquely identified at the NMS by a combination of the IP address of the TSU 120, and the Unit ID of the sending device. The Unit ID is present in the trap packet appended to the end of the trap community packet name, for example **public.4**. It is also included as an Octet String variable (**adProdPhysAddress**) in the trap packet as defined in the individual product MIBs. The latest versions of the product MIBs, by default, display the appended trap community name in their descriptions.

Typical steps required for Management Station trap configuration are loading the device specific MIBs and loading or creating device-specific Trap Definition Files. The current product MIBs contain keywords embedded in comments that can be used by some network management platforms to automatically generate Trap Definitions. Otherwise, the descriptions may be used as a template for Trap Definitions.

If individual option card port and slot identification is required, it is present in the four- byte **adProdPhysAddress** field of the trap packet. The first two bytes are the Unit ID of the base controller (least significant byte first). The next two bytes are port and slot number. This field is the second object identifier in all traps sent from TSU/TDU products. For traps from the ISU 512, the Unit ID is the first object identifier. See the product MIBs for more information

Definitions for Poll Link Up/Down traps are included in the TSU 120e MIB file: **TSU 120e.MIB**.

NOTE *The TSU 120 and TSU 120e share the same MIB.*

SNMP MIB BROWSER CONFIGURATION

The following steps, shown in *Table A-1* are required to config-
ure Network Manager MIB variable access through the TSU
120:

Table A-1. How to Configure Network Manager MIB

Step	Action
1	Load the desired product MIBs on the network management station. If, for example, the administrator is managing TSU 120 and ISU 512 devices, load **TSU 120.MIB, ISU512.MIB**, and **RFC1406.MIB**.
2	Create device entries in the NMS database for all units that are to be managed through the TSU 120. The host unit should be configured as the proxy agent for the external units. The IP address or host name used for the proxy designation is that of the TSU 120.
3	Set community names in the device's entries for external units to the TSU 120 community name with the device Unit ID appended as defined in the previous section *TSU 120 SNMP ACCESS on page A-3.*
4	Set the device timeout for all device entries in the NMS device data-base to five seconds, including the host unit.

SNMP MIB Files Supported by the TSU 120

Standard MIBs	ADTRAN Enterprise-specific MIBs
MIB-II (RFC-1213) **DS1 T1/E1 MIB** (RFC-1406) **Ethernet MIB** (RFC-1643) (TSU 120e)	**ADTRAN Product MIB** (ADTRAN.MIB) **ADTRAN DS1 extensions** MIB (ADS1.MIB) **TSU/TDU Enterprise MIBs** (TSU 120e.MIB)
The standard MIB files are usually included with most SNMP network management software.	The latest version of the ADTRAN enterprise specific MIBs are available from the following sources: • ADTRAN anonymous ftp site: **ftp.adtran.com** • By dial-up from the BBS: **256 -963-8169**) • ADTRAN web site: **http://www.adtran.com**

Appendix B   Understanding TR-08

The TSU 120 chassis functions as a **Remote Terminal in Digital Loop Carrier** and as **Integrated Digital Loop Carrier Systems** as described in TR-TSY 000008. The TSU 120 supports SLC96 framing, Mode I operation, ORB-13 and ORB-16 alarm formats, alarm reporting, and user-definable BPV threshold detection rate.

A basic familiarity with DLC systems, IDLC systems and TR-TSY-000008 is assumed, but the following information will be useful:

- All received **TR-TSY-000008 specific alarms** are reported locally within the history feature of the TSU 120.

- When the **DISABLE ALARMS** option is selected, no alarms will be sent on the DLF, but received alarms will be reported locally in the history.

- Other alarms normally reported by the TSU 120 will also be placed in history.

- Each TSU 120 needs to be configured as the **A SHELF**, as it is provisioned as a separate entity.

- All alarms will refer to **A SHELF** when received from TSU 120.

Table B-1 explains what conditions trigger alarms and how alarms are processed when received by the TSU 120.

Table B-1. Alarm Conditions

Name	Explanation
FELP	When the TSU 120 receives a FELP alarm, it will loop the incoming data directly to the outgoing data. LINE ON is placed in history. The alarms and loopback are cleared when FELP is no longer received.
Loss of Data	The TSU 120 will send **MINOR ALARM** and the **A SHELF ALARM** for 2.5s when it quits receiving the data link on the T-Span. It will also report TR-08 DL Down in the history. After 2.5s, **MAJOR ALARM, A SHELF ALARM** are sent across the Data Link.
OOF	The TSU will send **MINOR ALARM** and **A SHELF ALARM** upon receiving an out-of-frame condition. **TR-08 DL Down** and **RED ALARM** are declared in history for severe framing errors. After 2.5s, **MAJOR ALARM, A SHELF ALARM** are sent across the Data Link.
Loss of Signal	The TSU 120 will send **MINOR ALARM** and the **A SHELF ALARM** for 2.5s when it quits receiving a signal from the far end. It will also report **TR-08 DL Down** and **LOS** in the history. After 2.5s, **MAJOR ALARM, A SHELF ALARM** are sent across the Data Link, and **RED ALARM** is declared in history.
BPVs	BPVs that are received at a rate greater than the threshold set under **TR-08** options, will cause **MINOR ALARM** and **A SHELF ALARM** to be sent on the DL. If the BPVs remain above the threshold for 2.5s, the TSU 120 will send **MAJOR ALARM** on the DL. No events are placed in history.
Protection Line Switch	The TSU will not respond to this alarm.

TR-08 DS0 Conversion Table

Table B-2 contains the mapping conversions needed to map voice ports to the TR-08 network.

Table B-2. TR-08 DS0 Conversion Table

DS0	TR-08 Channel Number	Port
1	1	1.1
3	2	1.2
5	3	1.3
7	4	1.4

Appendix C　Network Pinouts

WIRING

Network Pinouts

On the rear panel of the TSU 120 is an eight-position modular jack labeled NETWORK. This connector is used for connecting to the network. See *Table C-1* for the pinout for the network connector.

Connections

The network connections are as follows:

Connector type　(USOC) RJ-48C
Part number　　AMP# 555164-2

Table C-1. Network Pinouts

Pin	Name	Description
1	R1 RXDATA-RING	Receive data from the network
2	T1 RXDATA-TIP	Receive data from the network
3	UNUSED	
4	R TXDATA-RING	Send data toward the network
5	T TXDATA-TIP	Send data toward the network
6,7,8	UNUSED	

Control In/Chain In

This is used as an EIA-232 port for connection to a computer or modem (Control In) or to another TSU 120 or TSU 100 (Chain In). See *Table C-2* for the pinout for the control/chain-in connector.

Connections

The chain-in connections are as follows:

Connector type	RJ-48
Part number	AMP# 555164-2

Table C-2. Control In/Chain in Pinout

Pin	Name	Description
1	GND	Ground - connected to unit chassis
2	RTS	Request to send - flow control
3	RXDATA	Data received by the TSU 120
4	UNUSED	
5	TXDATA	Data transmitted by the TSU 120
6,7	UNUSED	
8	CTS	Clear to send - flow control

Chain Out

This is used to connect to another TSU 120 chain-in connector. See *Table C-3* for the pinout for the chain-out connector.

Connections

The chain-out connections are as follows:

Connector type   RJ-48
Part number   AMP# 555164-2

Table C-3. Chain Out Pinout

Pin	Name	Description
1	GND	Ground - connected to unit chassis. Connected to GND of next unit (pin 10).
2	UNUSED	
3	TX DATA	Data transmitted to chained units by the TSU 120. Connect to RX DATA of the next unit (chain-in pin 3).
4	UNUSED	
5	RX DATA	Data received from chained units by the TSU 120. Connect to TX DATA of the next unit (chain-in pin 5).
6,7,8	UNUSED	

Nx56/64 DTE (V.35)

See *Table C-4* for the V.35 pinout Nx56/64 DTE pinout.

Connections

The DTE interface pinout is as follows:

Connector type   V.35
Part number   AMP# 92-4883-3-x

Table C-4. V.35 Pinout - Nx56/64 DTE

Pin	Name	Description
A	101	Protective ground (PG)
B	102	Signal ground (SG)
C	105	Request to send (RTS) from DTE
D	106	Clear to send (CTS) to DTE
E	107	Data set ready (DSR) to DTE
F	109	Received line signal detector (DCD) to DTE
L, J	—	Local Loopback (LL)*
N, BB	—	Remote loopback (RL)*
R	104	Received data (RD-A) to DTE
T	104	Received data (RD-B) to DTE
V	115	RX clock (RC-A) to DTE
X	115	RX clock (RC-B) to DTE
P	103	Transmitted data (TD-A) from DTE
S	103	Transmitted data (TD-B) from DTE
Y	114	TX clock (TC-A)
AA	114	TX clock (TC-B)
U	113	External TX clock (ETC-A) from DTE
W	113	External TX clock (ETC-B) from DTE
NN, K	—	Test mode (TM) to DTE

*(ignored by TSU 120)

Base DSX-1 (PBX)

See *Table C-5* for Base DSX-1 pinout connections for either-position Modular Jack Interface.

Connections

The modular jack interface pinout is as follows:

Connector type   RJ-48C

Table C-5. Pinout Connectors for Modular Jack Interface

Pin	Name	Description
1	R1 TXDATA-RING	Send data towards the DTE (PBX)
2	T1 TXDATA-TIP	Send data towards the DTE (PBX)
3	UNUSED	—
4	R RXDATA-RING	Receive data from the DTE (PBX)
5	T RXDATA-TIP	Receive data from the DTE (PBX)
6, 7, 8	UNUSED	—

10BaseT (TSU 120e only)

10BaseT is used to connect the TSU 120 to the local area net-work. See *Table C-6*.

Connections

The required wiring connections are:

Connector type (USOC)   RJ-45
Part number   AMP # 555164-1

Table C-6. 10BaseT Ethernet (TSU 120e only)

Pin	Name (TO NIC)
Pin1	TX1
Pin 2	TX2
Pin 3	RX1
Pin 6	RX2

Appendix D — System Messages

This appendix lists and defines the alarm and status messages that appear on the TSU 120 screen.

ALARM MESSAGES

Network Interface (NI)

Red Alarm	NI unable to frame align with incoming signal
Yellow Alarm	Remote alarm indication (RAI) being received from far end
Blue Alarm	Unframed all ones (1s) (AIS) being received at NI
Loss of Signal	No signal detected at NI

Nx56/64 Interface

The following messages indicate an alarm condition on the Nx56/64 card:

Clock Slip	Difference in frequency of the data clock at the network and DTE
PLL Alarm	Unable to achieve Phase-locked Loop on the clock provided by the network interface.
Zeros Alarm	All zeros (0s) data being sent toward the network interface
No EXT Clock	No external transmit clock at DTE (only appears if EXT CLK is selected)

DSX-1 (PBX) Interface

The following messages indicate a condition on the Base DSX-1 (PBX) interface:

Red Alarm	Not able to frame data coming to the DSX-1 interface; sometimes referred to as out-of-frame (OOF)
Yellow Alarm	Remote alarm indicator (RAI) being received by the DSX-1 interface
Blue Alarm	Receiving unframed all 1s at the DSX-1 interface [alarm indicator signal (AIS)]
Loss of Signal	No signal detected by the DSX-1 interface

Status Messages

Network Interface (NI)

Payload On	Payload loopback activated
Line On	Loopback off
Loopback Off	All loopbacks deactivated
Factory Restore	Factory setting restored
Power On	Unit powered on
Self-Test	Internal self-test performed
TR-08 DL Down*	TR-08 data link is down
TR-08 DL Up*	TR-08 data link is up
Minor Alarm*	Loss of sync, carrier los, BPV threshold exceded, or data link failure
Major Alarm*	Conditions for a minor alarm have continued for greater than 2.5 seconds

NOTE

TR-08 alarm messages appearing in the alarm or history log have been received from the far end. If the NI detects one of the aove conditions, it will send the appropriate alarm (if enabled) to the far end but no message will appear in the alarm or history log.

Nx56/64 Interface

The following messages indicate the status of the Nx56/64 card:

Loop Up	Data is looped at both the network interface and DTE interface of the card
Remote Loop Up	Sending V.54 pattern in an attempt to loop up a remote device
511 Pattern On	Sending 511 pattern towards the network interface
Loop Down	Data is no longer looped back at the network interface or DTE interface
511 Pattern Off	No longer sending 511 pattern towards the network interface

DSX-1 (PBX) Interface

The following messages indicate the status of the DSX-1 interface:

Frame Slip	Indicates a Frame Slip has occurred on the DSX-1 interface; this is present in Alarm History only
Line Loop Up	Line loopback activated
Port Loop Up	Port loopback activated
Loopdown	Loopback has been deactivated

Appendix E   Specifications

ELECTRICAL SPECIFICATIONS

T1/FT1 Interface

T1 Line Rate	1.544 Mbits/s +/- 75bps
Line Code	Bipolar,RZ; AMI or B8ZS
Framing	D4(SF), ESF, or SLC96
FT1 Line Rate	DS0 Channelized (multiple of 64 kbps)
Transmit Timing	Network, DTE, U-BR1TE Secondary NI, Normal (CSU) or Internal
Input Signal	0 to -36 dB (DS-1)
Line-Build-Out	0, 7.5, 15, 22.5 dB, AUTO
Connector	RJ45
Test Jacks	Bantam jacks: TX and RX (to Network) and MON

Compatibility

T1 Interface	Pub 62411
ESF Format Interface	TR. 194
ESF Performance Monitoring	TR. 54016 and T1.403
Approvals:	FCC Part 15
	FCC Part 68
	UL 1950

Nx56/64 (V.35 Interface)

DCE Interface	CCITT V.35 Synchronous
Rates	56kbps - 1.536Mbps in 56k or 64k increments
Clock Options	Normal/Inverted and internal/external
Tests	Local Loopback (bilateral)Remote Loopback (V.54)
Test Pattern	511 with errored seconds display and error inject capability
Data inversion	Menu selectable
1s Density Protection	Force 1s to network after one second of consecutive zeros from DTE. User selectable (On/Off)
CTS, DCD, DSR	Normal or Force On
Connector	Winchester (V.35) female (on the Y cable)

DSX-1 Interface

Line Interface	DSX-1 per ANSI T1.102
DSX Receiver Input Range	-10 dBdsx to +6 dBdsx
Line Rate	1.544 Mbps
Capacity	1 to 24 DS0s
Line Codes	AMI, B8ZS
Framing	ESF per ANSI T1.403 and AT&TPub. TR 54016, D4 per AT&T Pub. 62411
Line Length	-7 dBdsx to 655 ft in 110 ft steps
Timing	Supports network, secondary, and CSU timing modes
Test Capability	Line loopback, port loopback (internal toward mux)
Connector	RJ45
Test Jacks	RX MON, RX and TX (toward PBX)

MANAGEMENT INTERFACES

Chain In/Out Ports

Interface Devices	PC Serial Port, Modem or SLIP connection to router
Interface Type	EIA-232
Data Rates	2400, 1200, 2400, 4800, 9600, 19200, 38400
Data Format	EIA-232 N81
Protocols	T-WATCH/ADLP, ATEL/ADLP, TCP/IP/SLIP
Connector	RJ-45

10BaseT Interface (TSU 120e only)

Interface	IEEE 802.3 Compliant	
Rate	10 Mbps	
Connector	RJ45	
Receiver	accepts signal > 300mV	
Protocols	Network:	IP
	Transport:	TCP, UDP
	Service:	SNMP, TELNET, ICMP, ARP, PING, T-WATCH

Option Slot Interface

Interface	ADTRAN proprietary, accepts standard TSU Option Modules.

Chassis Specifications

Height	Less than 3.5 inches (will fit in a 2U rack mount opening)
Width	Two units will fit within a 19-inch rack

Environmental Specifications

Input Power	90-120VAC, 47-63 Hz
Fuse	0.6A, 250V
Operating Temperature	0 deg C to 45 deg C
Max Power Consumption	15 Watts
Max Current	0.2 A

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Product Support Information

Presales Inquiries and Applications Support
Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

Applications Engineering   (800) 615-1176

Sales   (800) 827-0807

Post-Sale Support
Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

Technical Support   (888) 4ADTRAN

Repair and Return
If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Customer and Product Service (CaPS) department to issue an RMA number. For information regarding equipment currently in-house or possible fees associated with repair, contact CaPS directly at the following number:

CaPS Department   (256) 963-8722

Identify the RMA number clearly on the package (below address), and return to the following address:

ADTRAN Customer and Product Service
6767 Old Madison Pike
Progress Center
Building #6 Suite 690
Huntsville, AL 35807

RMA # _____